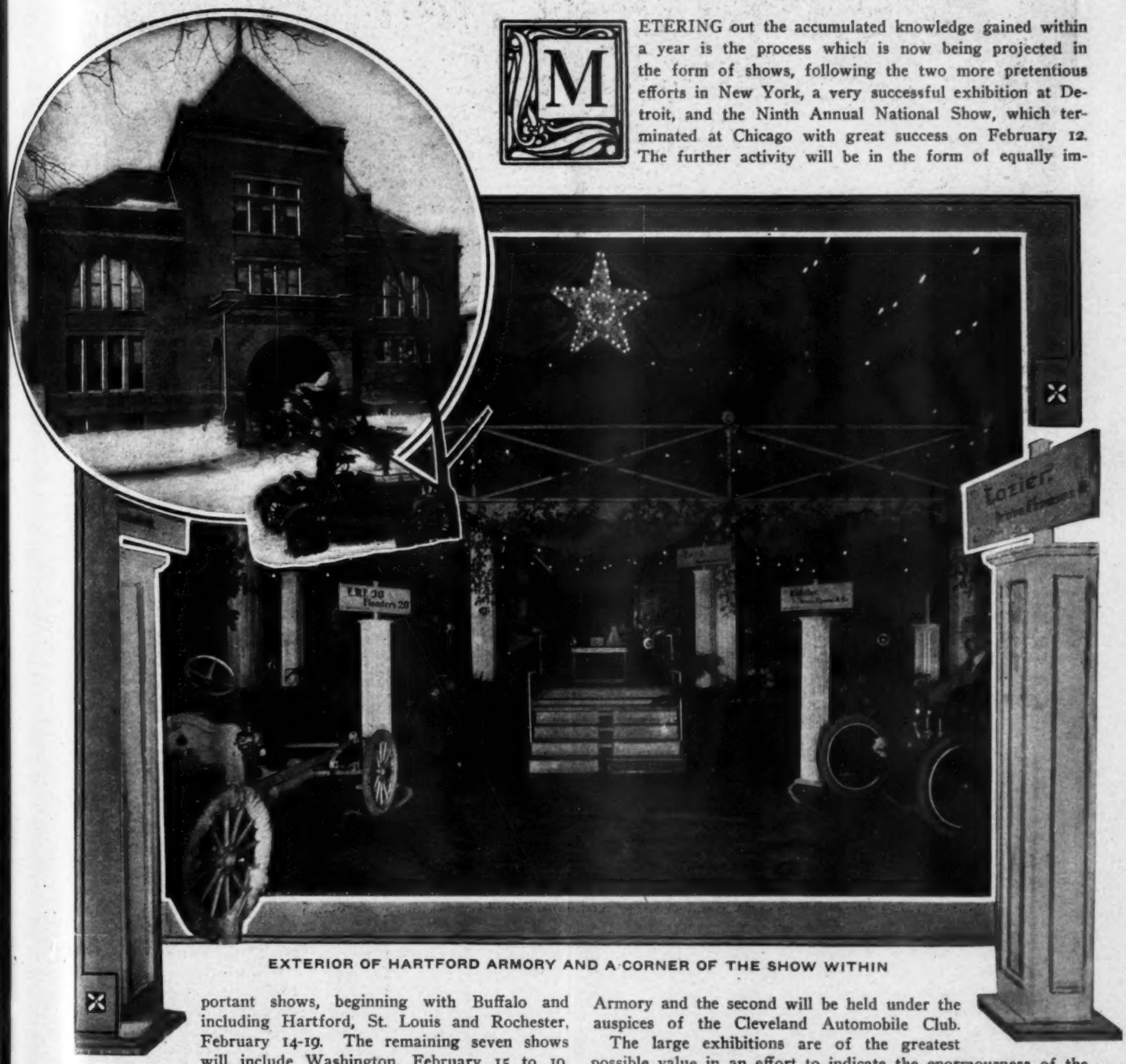
OL. XXII NEW YORK—THURSDAY, FEBRUARY 17, 1910—CHICAGO No. 7

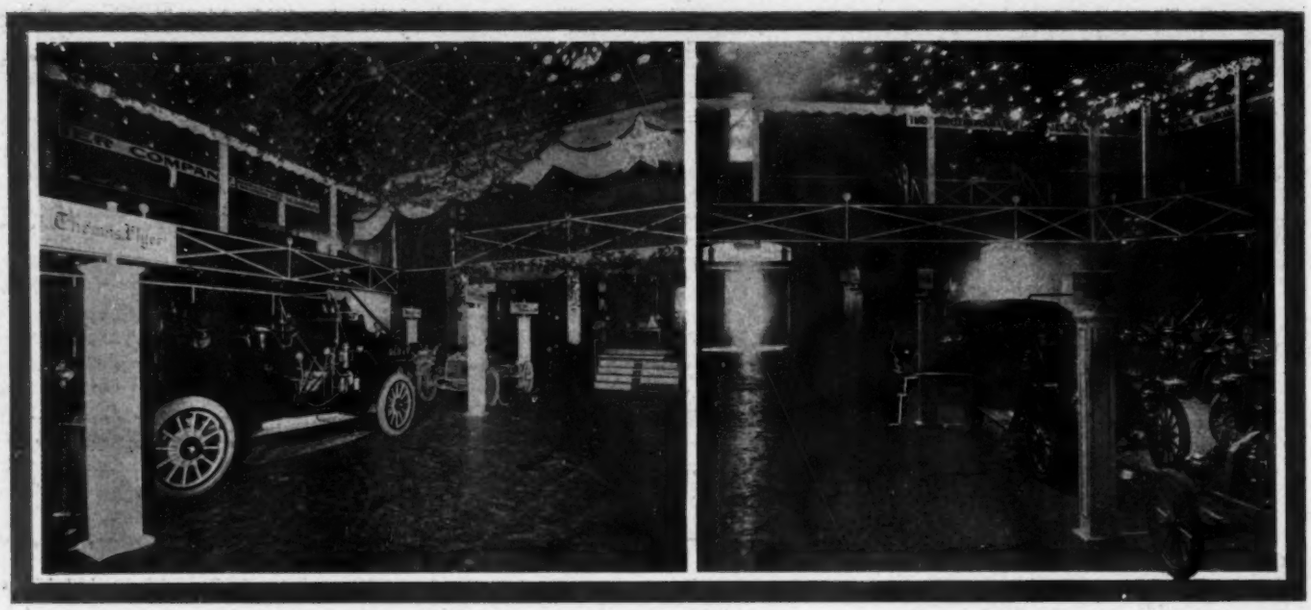
THE AUTOMOBILE

METERING out the accumulated knowledge gained within a year is the process which is now being projected in the form of shows, following the two more pretentious efforts in New York, a very successful exhibition at Detroit, and the Ninth Annual National Show, which terminated at Chicago with great success on February 12. The further activity will be in the form of equally important shows, beginning with Buffalo and including Hartford, St. Louis and Rochester, February 14-19. The remaining seven shows will include Washington, February 15 to 19, inclusive; Grand Rapids, February 17 to 19, inclusive; Minneapolis, Newark, Los Angeles, Salt Lake City and Cleveland, with dates from February 19 to 26 inclusive. Cleveland, however, will have two separate shows, one of which will be held at the Central Armory and the second will be held under the auspices of the Cleveland Automobile Club.



EXTERIOR OF HARTFORD ARMORY AND A CORNER OF THE SHOW WITHIN

The large exhibitions are of the greatest possible value in an effort to indicate the enormousness of the automobile industry, but they offer the disadvantage of congestion, and the patrons of the industry are prevented from examining the products in detail with a view to judging as to their qualities, discriminating as between the methods of the respective



MAIN AISLE OF HARTFORD SHOW, VIEWED FROM OPPOSITE ENDS—THOMAS APPEARS PROMINENTLY

schools of design, and tabulating the relative facts in the mind for convenient use at the propitious moment.

Among the strong reasons why the lesser shows present positive advantages are those which are reflected by an examination of the situation as it obtained at Chicago, in which 78 different makes of automobiles were lined up, with from two to five models of each make there to be examined. The total of the cars was 211, which is equal to saying that an interested spectator would have to examine 35 automobiles per day to cover the ground, and he would only be permitted to take substantially 15 minutes in the examination of each automobile. This schedule would leave no time whatever to devote to the examination of the major accessories, of which the automobiles of this year are so largely constituted, and as for the minor accessories, or accessories of convenience, it would not be feasible to devote to them a single thought.

In going into the shows which offer a wider opportunity for an inspection of the automobiles exhibited, it will not be without profit to have in mind just a few of the statistical characteristics of the automobile industry as a whole. It has been conservatively estimated that the product of the year will be approximately 280,000 automobiles, and the money exchange of the year foots up to the enormous sum which is just under $500,000,000. The automobiles which are being made would string out in a row to the close approach of 650 miles, and the passenger carrying capacity, taking them as a whole, would not be far from 1,200,000 adults. Thirty million dollars have been expended in factory buildings, and they cover 2,500 acres of ground, one of which plants, for illustration, reaches over an area of 101 acres.

It is fortunate for labor that upward of 120,000 skilled artisans are engaged, they having been recruited from congested industries, notable among which should be listed the machine tool zone of activity. These men will receive for their direct share the near approach of $100,000,000, which as a tax on the whole people might be stated in a homely way as equal to the purchase price of a dozen loaves of bread per inhabitant. The value of the industry to the country as against this relatively insignificant tax upon the individual resources, putting it in the same homely terms, reaches a figure which is scarcely within the realm of comprehension, it having been figured as equal to the value of 1,000,000,000 loaves of bread.

Under ordinary conditions men who do things as the men who command the rank and file which is engaged in producing automobiles, are prone to forget the foundation, and in allowing themselves to be lauded for their activity depreciate the value of the stable structure on which the whole rests—the patrons of the industry.

That users have been loyal to their ideals, despite the many disappointments, is the prime reason for the greatness of the automobile industry as it stands to-day, nor could the cars which are in fettle for a close inspection be placed on parade, were it not for the peculiar characteristic of men who buy; each one of them, almost without exception, has maintained that the automobile he invested in was the most suitable for him, even granting (which he is rarely willing to do) that some other make of automobile is superior in certain respects, which, however, is beside the question as he sees it.

It is this loyalty on the part of users which makes it possible for investors to build millions of dollars worth of automobiles even before there is any attempt made to ascertain if there is a buyer for each one of them, although absolute ruin would follow were purchasers to balk.

It is this certainty of success from the selling point of view that brought the quality of automobiles up to the present standard, and which assures that the standard will be advanced by easy stages, year after year. The few who have waited for a condition of ideal perfection before making a purchase were mostly of the class who would have to deprive their children of reasonable comforts had they done otherwise, and the very condition which induced them to hold back has proved to be a blessing in disguise.

The automobile industry, taking it as a whole, is in the hands of men who fully appreciate the value of a reputation; they know very well that a "run," while it is closely associated with banking, has a synonym; that lack of confidence will lead to a slump, and that it is necessary to maintain a high standard in order to be successful. Fortunately, the very worth of the automobile, the divers uses to which it may be profitably put, adds stability to its manufacture, and this condition is enough to induce money to come to the rescue of the maker who knows the worth of quality, and who employs the brains and the brawn which is capable of doing the work.

That time is practically at hand when the automobile will be a standard product, ordered without the necessity of seeing the finished article; the automobile dealer will call for a consignment of cars, specifying merely the seating capacity and power, confident that when received they will answer his requirements. Although shows may in this way lose some of their importance, they will continue to do valuable missionary work. Their spectacular features form a most valuable attraction.

LOCAL SHOWS FLOURISH THE COUNTRY OVER

FOLLOWING the great National exhibitions in New York and Chicago, the present week finds a number scattered over the country. In the East, Hartford, Conn., is having its exposition, under the management of the local dealers' association; New York State has two, at Buffalo and Rochester. In the West, St. Louis dealers are having their annual inning. The Grand Rapids, Mich., Automobile Club will open its show in midweek on Thursday. To next week belong, in reality, those opening on Saturday, February 19, namely, Minneapolis, Minn.; Newark, N. J.; Los Angeles, Cal.; Salt Lake City, Utah, and Cleveland. In Hartford, Conn., the third annual automobile show of the Hartford Automobile Dealers' Association opened at Foot Guard Hall, Monday evening, and continues for a week. The home of the famous crack military command presented an animated appearance. This notable hall has housed many attractions in its day, but none of more importance to the City of Hartford, from a commercial standpoint at least. The Hartford Automobile Dealers' Association proved conclusively on two former occasions that, notwithstanding the proximity of this city to New York or Boston, a local automobile show could be conducted as a successful venture if it was only done in the right way. The association discovered the right way three years ago and has made good on three successive occasions.

Within the past few years the automobile trade has increased by leaps and bounds and Hartford has become the mart for the smaller towns for miles around, so that although the city has a population of but 100,000 it serves in reality as the center for twice that number. The cars on exhibition range in price from $500 to $5,000, and the aggregate value of the cars shown is estimated at $100,000, although in a comparatively small building. The main floor is given up to car display, together with the stage, the two rooms off the main floor, and a portion of the basement. The balconies are devoted to the display of accessories.

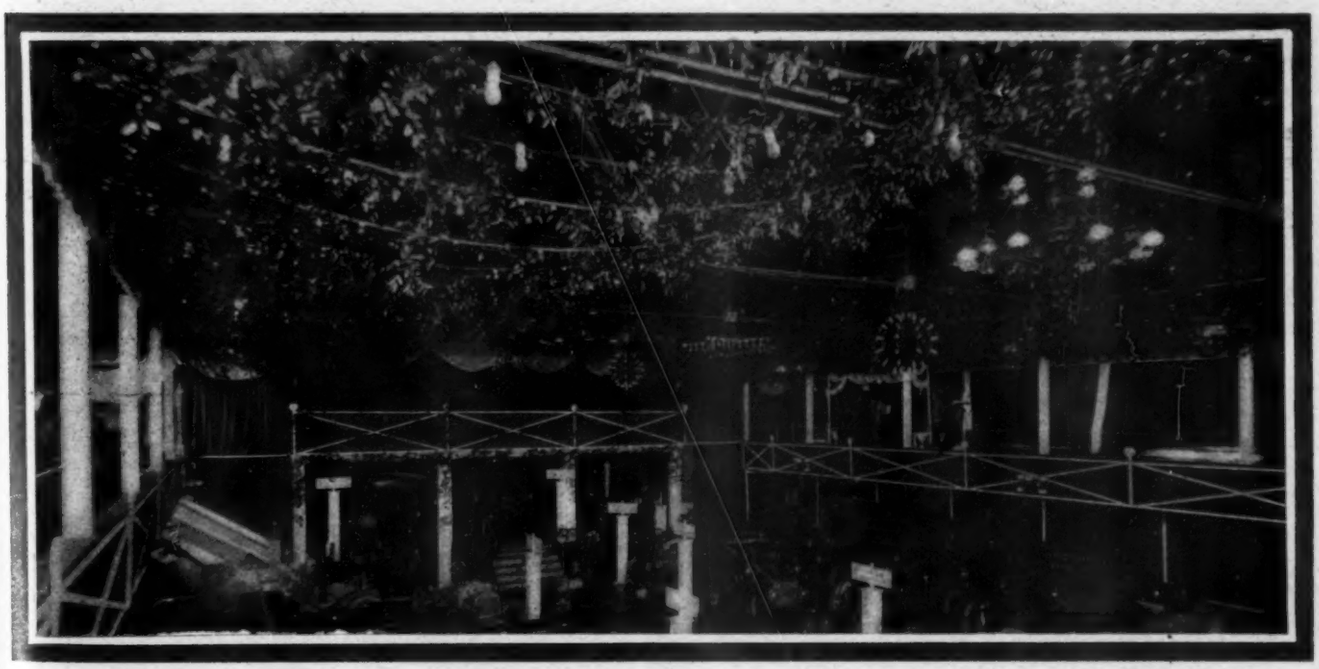
The committee tried to serve up something a little different in decorations this season, and succeeded. The effect is colonial, and even the uniformed attendants are dressed in the costumes of the time of Washington, with powdered wigs and all that sort of thing. Above the stage proper is a balcony which is made to represent the balcony of one of those colonial mansions which all are familiar with. The effect is well carried out. The sign posts of the various booths are of the same style.

To make the show the more entertaining the Foot Guard orchestra holds forth in the elevated balcony, and then, too, there are other attractions a bit out of the ordinary. The Tempo male quartet, which is one of the best of the sort in this section of the country, is also in evidence.

But as to the show itself. On the right of the main entrance is the Jackson stand, with two snappy models shown by Kilby & Bassett. On the opposite side is the Mitchell, followed by the Maxwell, in six different models. The Baker electric is exhibited by the Electric Auto Station; this is the first appearance of this vehicle in Hartford. Next to the Jackson exhibit is that of the Miner Garage, where are shown two models of the Pierce-Arrow and two Buick pleasure cars and a delivery wagon, this latter being much in favor. The Pierce has grown to be regarded locally as one of the most reliable cars and the representation has increased materially since the show a year ago.

Next to the space of the Maxwell is that of the Palace Automobile Station, agent for the Thomas, Studebaker-Garford, E-M-F, Flanders and Waverley electric. Here are shown a Thomas town car with a brougham body, a Thomas Flyer touring car, a Studebaker-Garford touring car, a Flanders roadster, runabout and chassis and an E-M-F chassis. The little Flanders was a matter of much interest to the crowd, who lingered about this booth in goodly numbers. Opposite the Thomas exhibit is that of Brown, Thomson & Company, who show the Cadillac touring car and a chassis in which the parts are exposed and in operation. One of the snappiest appearing cars in the show is the Briarcliff model Lozier, on this stand; the little six Lozier is also popular. The Stevens-Duryea is shown by the same firm in models X and AA.

Upon the stage, where it has now reposed on three different occasions, is the Ford line shown by the Elmer Automobile Company, including a touring car, runabout, coupe and town car. The Ford shares the stage with the Reo, which comes back after an absence of a year. The Knox is shown in one touring model on the same stand. Off the main floor, in the south



COLONIAL DAYS RECALLED BY THE NOVEL DECORATIVE SCHEME OF THE HARTFORD DEALERS' SHOW

room, appears the Elmore in three models, not the least interesting being the new model "46" with the differential or two-diameter pistons. This car attracted much attention and the two-cycle advocates were numerous. On the north side of the hall in the room off the main floor the Rambler is shown by Foster & Company, of this city, who took the agency for this car a few months ago.

Down in the basement are shown several cars that have proved to be attractions. The little Hupmobile was one of the most interesting cars on exhibition. It is shown by C. K. Hansen, a local garage man who has built up a good business in the past two years. The Empire "20" is another newcomer and is shown by Kaeser & Wilbur, of West Hartford, who recently entered the field with very bright prospects. Several sales have already been made. The Franklin is shown by S. M. Hutchins and is as popular as ever. The air-cooled proposition has many followers in this city, and the Franklin is, by the way, the only air-cooled vehicle in the show. The Everitt "30" is shown by the J. T. Curtiss Company, and so is the Velie—both newcomers.

To make the week the more interesting from the autoist's point of view, the Connecticut Automobile Show Association is holding a show at the First Regiment Armory. Here the decorations are not so lavish, though there is far more available floor space on the one floor than is to be had at Foot Guard Hall. The decorations are simple yet effective, and one of the best bands in the State is on duty, rendering all the popular strains for those who come to view the cars.

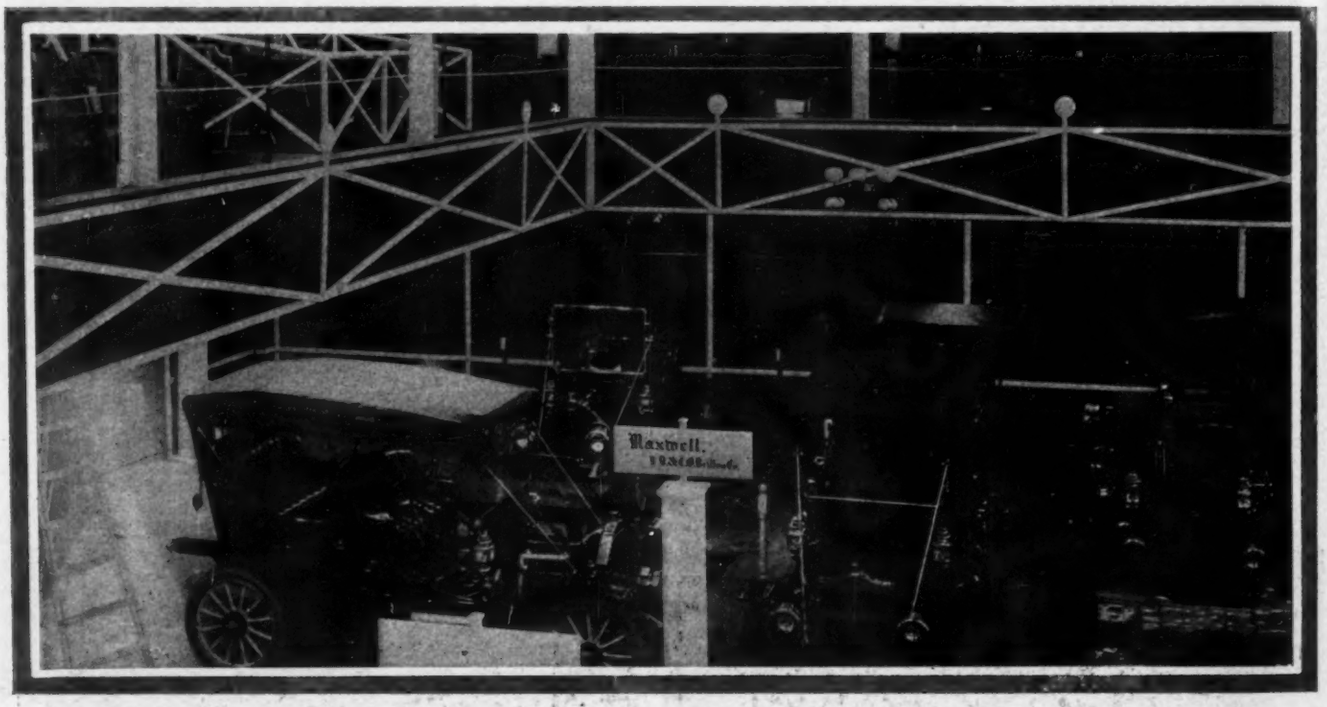
Here is shown the Houpt, a product of which Connecticut is proud. A 60-horsepower stripped chassis is shown as well as a toy-tonneau car. This is finished in red, and is the highest powered car on exhibition here this week. The McCue and the Staver appear, both in touring models. The Jackson, which is on exhibition at the dealers' show, is also here. Matheson comes to this city for the first time and is an object of much interest. Two Corbin models are shown, as well as the Cameron and Moline. The Belmont is another new Nutmeg product and is shown in this city for the first time. Then, too, the Winton is on view. With two shows in full swing, in addition to private exhibitions, needless to say there is much doing locally this week. The various dealers without exception report a rushing business; there have been a great number of actual sales.

BUFFALO INCLUDES A LIMITED NUMBER

At 8 o'clock Monday evening a bugler sounded the assembly from the balcony of the Broadway Arsenal. At the signal, Mayor Fuhrmann, flanked on the right and left by Charles F Monroe, president of the Automobile Trade Association, and Laurens Enos, president of the Automobile Club, pressed an electric button. The slight pressure turned on the electric current, and in a twinkling illuminated the Armory with the radiance of a multitude of electric bulbs. The lights rippled and blazed along the folds of the flag that spanned the entire roof of the drill hall, and the exhibitors and visitors bared their heads while the Seventy-fourth Regiment Band played "The Star-Spangled Banner."

The flag, the largest in the world, was the keynote of the decorations. Its symbolization was of the fact that there were only American-built cars in the show. The patriotic suggestion was carried out in the decorations which concealed the walls and even the windows of the dingy Arsenal. National shields decorated the burlap that hid them, and rosettes in the national colors festooned the spaces between the shields.

The Curtiss aeroplane that seemed to float in midair under the folds of the flag was an effect calculated as much for its decorative value as for its drawing power as a curiosity. The machine was too far aloft to afford the curious an opportunity to study its details. It attracted considerable interest, but did not detract from the principal business of the evening, the study of the 1910 models of automobiles.



HARTFORD'S ATTRACTIVE MAXWELL EXHIBIT, INSTALLED UNDER THE OVERHANGING COLONIAL BALCONY

There was little in the way of ornamentation to distinguish one exhibit from another, save for the difference of space. The signs were uniform in size and shape, consisting of national shields containing a gilt field in which the names of the exhibitors were printed in blue letters. The signs were on standards 8 feet high. Some of the exhibits were on a very large scale, which worked toward keeping their number down, despite the large floor area. There were in all but fifty-two exhibits, including approximately two hundred cars. There were as many more applications for space before the show was opened, but as it was alloted a month ago the latecomers were disappointed.

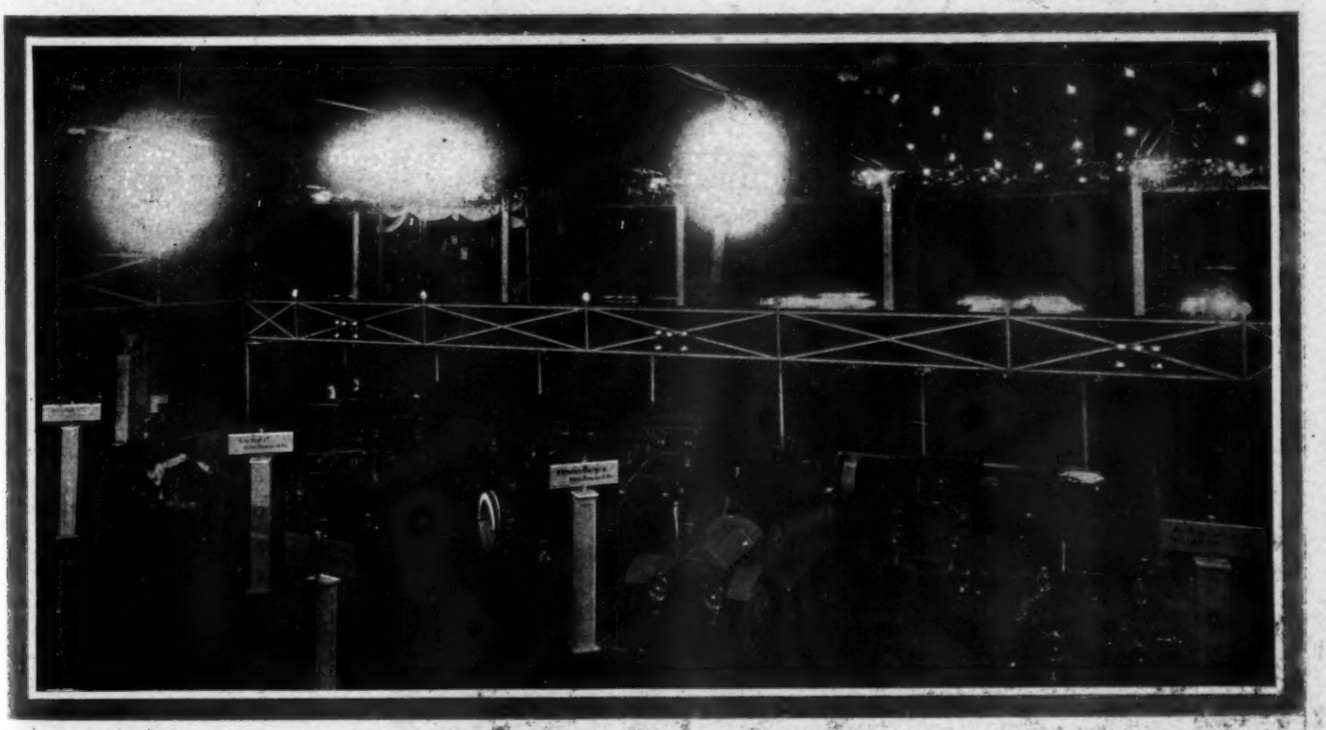
The Bison Motor Car Company occupies two spaces with its exhibits of K-R-I-T and Abbott-Detroit cars. The Pierce-

COLONIAL BACKGROUND, HARTFORD EXHIBIT OF THOMAS, E-M-F, FLANDERS, STUDEBAKER AND WAVERLEY

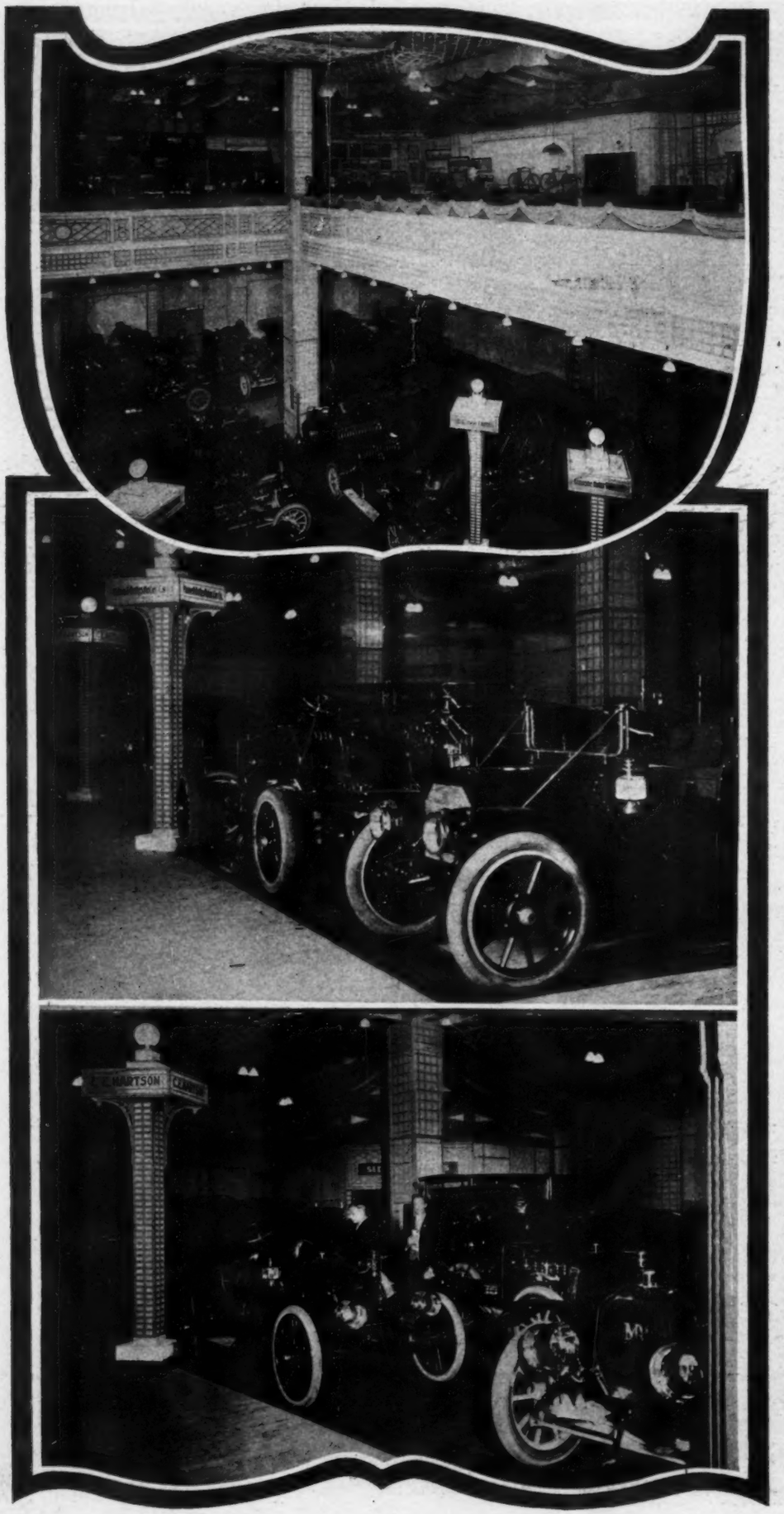
Arrow Company occupies three spaces, with four Pierce-Arrow cars and a painted chassis. The Stoddard-Dayton exhibited a polished chassis and five 1910 models, together with the torpedo type of runabout. The same agent displayed alongside these four Mitchell cars. Three types of Cartercars and a chassis were exhibited. Two Inter-State cars and an Empire car were shown side by side. The Franklins were out in three types, together with a chassis and a torpedo runabout. The Buicks turned out in force, ten of these cars filling six exhibit spaces.

Three Stevens-Duryea cars and a polished chassis shared accommodations with two Hudsons, three Knox touring cars, a Knox chassis and a torpedo runabout. The flock of Chalmers-Detroit "Bluebirds" numbered five, with the "30" and its driver Joe Matson and the "40" and Lee Lorimer. Four cars represented the Oaklands, and ten Oldsmobiles presented the various phases of that car. The total of the different makes of cars exhibited was forty-one.

The Commercial cars and trucks were represented by three makes, the Rapid, the American and the Knox. The electric division was represented by the Babcock and Waverley, the latter having at last headed an invasion of the Babcock in its home city.



HARTFORD DISTRIBUTORS OF THE PIERCE-ARROW AND STEVENS-DURYEA HAD WELL-ARRANGED EXHIBITS



ROCHESTER

ROCHESTER, N. Y., Feb. 14—Notwithstanding a bad snowstorm and general inclement weather, something over 5,000 people turned out on the opening night of the third annual show held by the Rochester Automobile Dealers' Association, packed Convention Hall and gave a start to the undertaking that augurs success. Eighty-five exhibitors crowd the basement, main floor and balcony of this spacious hall almost to the limit, and make a splendid showing.

From a spectacular point of view alone the show is a beauty. The color scheme is white and green, very much after the fashion of that held in the Grand Central Palace in New York City. The walls are adorned with suitable paintings illustrative of the development of the industry. The ceilings are draped with green and white bunting and electric lights, presenting a mild and pleasing general design. Palms and fresh cut flowers are to be found on every hand and the signs and space divisions are uniform throughout. The arrangements for handling the crowds are excellent, and notwithstanding the number of people who attended there was no delay either at the exits or the entrances.

In one respect at least Rochester has outdone all the other shows, even including the national shows. That is in respect to the music. Instead of having one band in the main hall to answer all purposes there are no less than two full military bands and an orchestra. The bands are on the two divisions of the main floor and the balcony and the orchestra is in the basement. The building is so arranged that they do not conflict.

The Aero Club of Rochester has furnished a large model monoplane which hangs conspicuously over the band stand in the main floor, and in the balcony and basement are to be found a number of motor boats and marine engines by way of variety.

Perhaps one of the most expensive exhibits is that of S. J. Macy & Company. That company is showing the identical Palmer-Singer exhibit, Dreadnought and all, that was shown at both New York and Chicago. This entailed some considerable expense and no little work, for the same cars were in Chicago last Saturday night. They were expressed and reached Rochester Monday just in time to be set in place. After this show they are to be shipped to Portland, Me.

The Sullivan Motor Car Company is showing for the first time the Sullivan light delivery wagon. This is a 16-horsepower, two-cylinder car that sells for $1,050.

EXHIBITION

Thomas J. Northway is showing a Ford T polished sectional chassis made in his own shop. Not being able to get one from the factory, Mr. Northway took down one of his cars, polished the chassis and then cut away the engine so as to show the moving and working parts.

Boughton & James are showing for the first time a solid metal non-skid armor that certainly looks as though it will do the things intended. It is cast in sections so as to fit around the tire and is held in place by longitudinal bolts and threads which when tightened hold it fast against the tire and prevent creeping. It is guaranteed against breaking or bending and is said to be absolutely skid-proof even on ice.

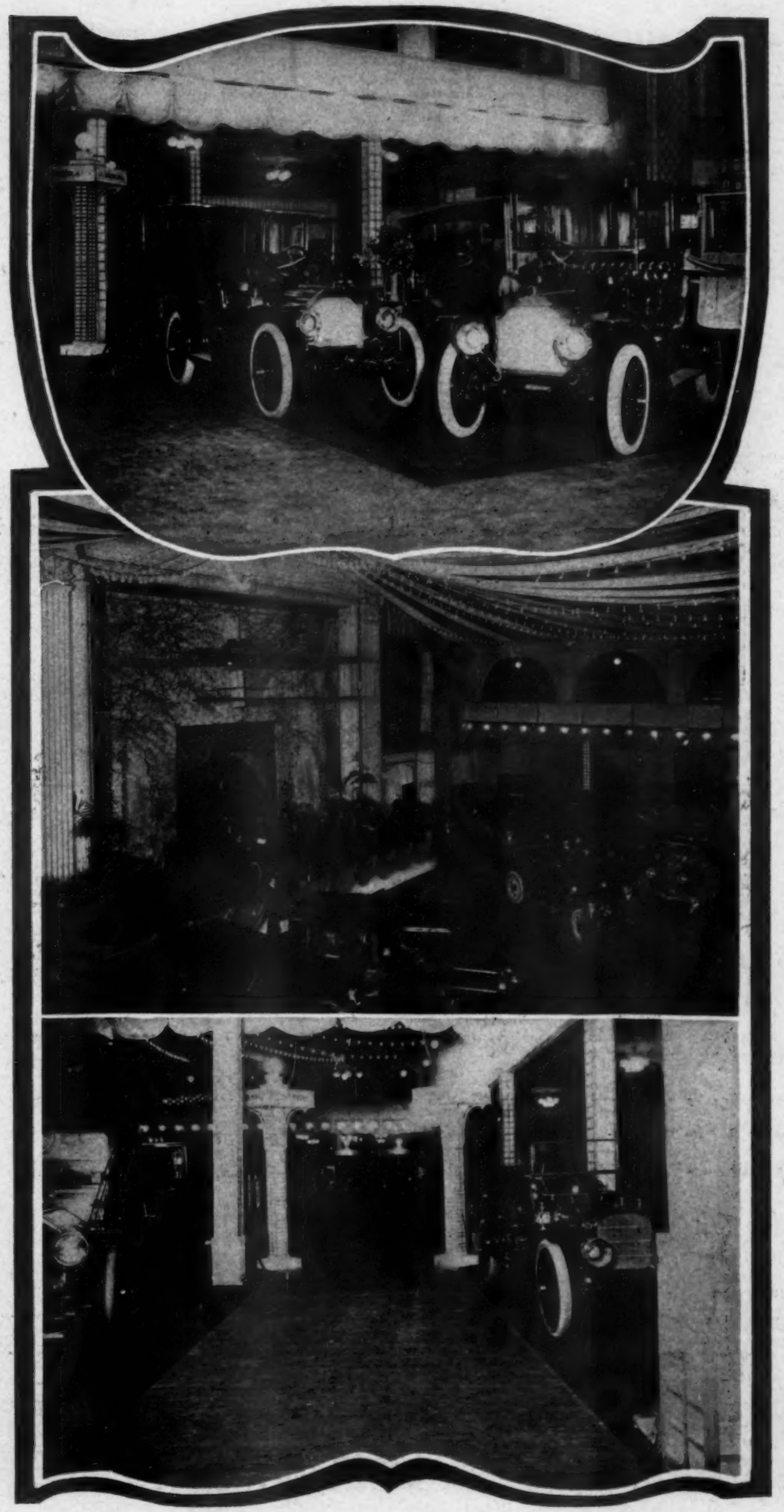
The only car of local make on exhibition is the Rochester Special, shown by C. P. Smith & Company. It is one of several built practically for the local trade. In size it is the largest in the place, being fitted with a Herschel-Spillman motor of six cylinders, 5 1-2 by 6 inches, rated at 75-horsepower. The tire equipment is 40-inch on all four wheels, and the other dimensions are in keeping. Mr. Smith is considering the building of a very large number of these cars this year.

At the conclusion of the first night's exhibit a meeting of the dealers' association was called, principally for the purpose of presenting William C. Barry, Jr., the president, with a token of esteem, in return for his efforts toward the success of the show. Mr. Barry, who is the Selden distributor in this section, has been both president and chairman of the executive board of the dealers' association for three years, and during that time has been most prominent for his devotion to its best interests.

Captain A. C. Simmons, the manager of the show, ruled the meeting, and with a neat speech delivered to Mr. Barry a silver-mounted pigskin suitcase, inscribed with the regards of the association. Mr. Barry responded briefly.

A concerted effort has been made by way of boosting and advertising throughout the neighborhood to reach 30,000 attendance for the week, and it looks as though this will be consummated. Thursday night will be society night at double admittance.

While the snow was welcome at the time of the recent Rochester-Syracuse endurance run, it was far from that to the demonstrators at the show. These were obliged to make their cars do their prettiest in order to make any kind of a showing against the heavy fall of snow.



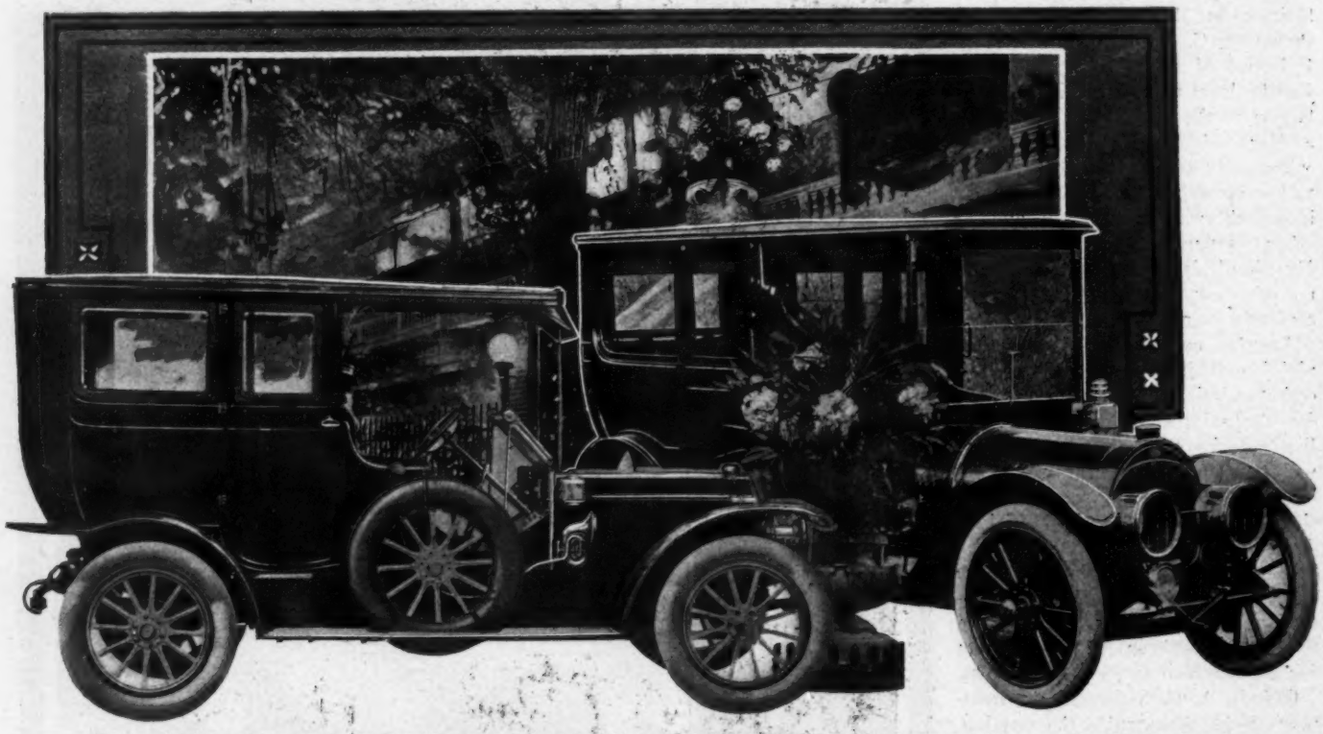
CHICAGO SHOW CLOSES WITH EXCEPTIONAL RECORD

CHICAGO, Feb. 14—The annual show of the National Association of Automobile Manufacturers came to a successful ending Saturday night, and, looking ahead a year, Manager Miles announced to-day that the affair would be repeated in 1911 in the same buildings, the Coliseum and the First Regiment Armory, despite reports that there are plans under way for the construction of a twelve-story building on Michigan avenue, between Twentieth and Twenty-first streets, which might be used for show purposes. Although cognizant of the plans for the erection of this gigantic structure and knowing that the promoters of the enterprise desire his support, Mr. Miles declares that he is not in on the deal and that he is well satisfied with the buildings which he now uses for his big show. No date for the 1911 exhibition has been set as yet, but it will probably take place in February, as it has done for several years past.

Any one who was at the show last week could not but remark at the big attendance and the vast amount of business that evidently was being done by the 267 exhibitors, and it was clearly apparent that the 1910 exhibition of the N.A.A.M. had a larger attendance than any of its predecessors and that more cars were sold, both wholesale and retail, than ever before. Indeed, the claim is made that the Chicago show excels both of the New York affairs put together in attendance and business, and this claim goes without contradiction on the part of manufacturers who showed at both Chicago and New York.

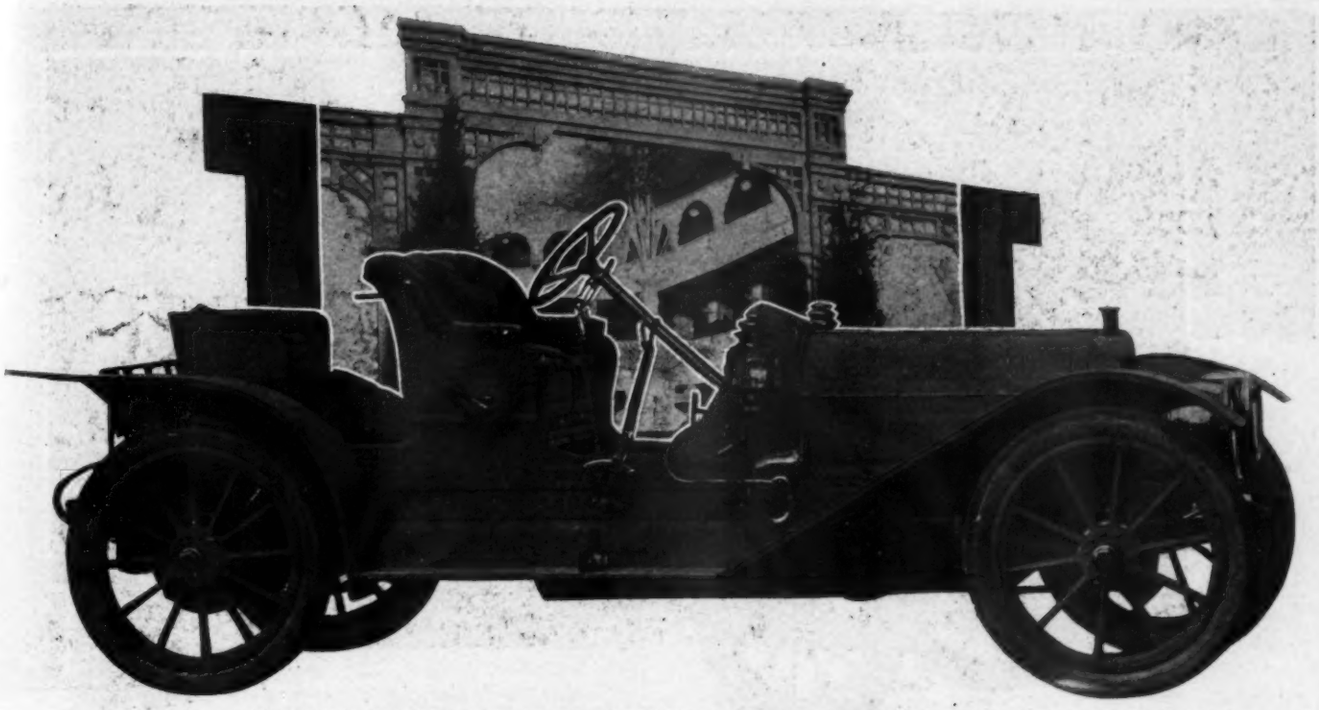
Actually, there were 140,000 paid admissions to the Chicago show for the seven days and nights which it ran, and the number of people who actually passed through the turnstile must have been at least 200,000. The records show that 2,024 exhibitors' buttons and 1,548 dealers' buttons were issued, which, if they were used each day, would add at least 32,000 to the 140,000 paid admissions; on top of this there was the paper of Saturday, the opening day, as well as complimentary tickets issued to the press. Of the 4,500 exhibitors and dealers on the list 75 per cent. came from out of town, and each one of them probably spent at least $50 during the week for his expenses. It is easy to see just what this meant to Chicago—$1,000,000 at the very least. The books show that dealers were here from Maine and Mexico; and some of the larger cities, like Denver, Kansas City, Milwaukee, Minneapolis and Indianapolis, sent large delegations of dealers.

Every one of the big car makers is loud in his declaration that Chicago is the best show of the year. During the week many new agencies were appointed in vacant territory, although it had been generally supposed that nearly every big concern had closed for the year. Besides this, the volume of retail business was so great in contrast to other years as to be most marked. Heretofore few retail sales were recorded, but this time many people actually attended the show and placed their orders, most of it being new business which had not been worked up before, and which, therefore, was unexpected. As to who did the biggest business at the show, there is considerable rivalry. There were several concerns—new ones—which placed many cars, but which hardly claim this was done because of the show, for they had been working through their agents before. For instance, Walter Githens, representing the Everitt in this territory, announces he took orders for 176 cars in his section.



Types of Limousines Which Combine Luxurious Bodies and High Power; on the Left Rambler, on the Right, Royal

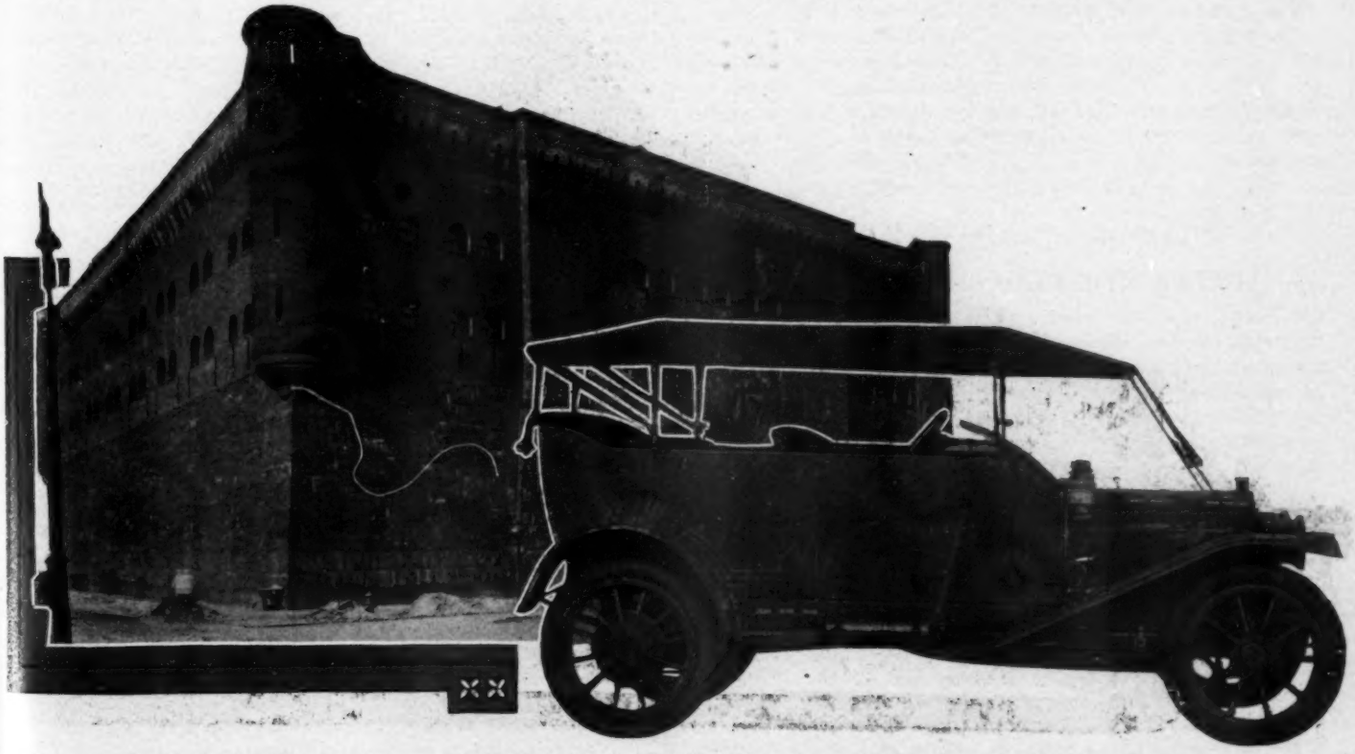
The Pierce-Arrow Company was handicapped somewhat by not having any 1910 cars for sale, business they did do at the shop being confined to 1911. There were few agents at the Pierce-Arrow booth during the week, but notwithstanding all this a fair business in 1911 stock was done. The Packard, which was shown by its local agent, confined itself to retail business, and reports many sales. The Knox Company did a big wholesale business, and the Oakland met with such a demand for its new 30-horsepower model that it was forced to stop taking wholesale orders for that type. Reo did a good business in both branches, and its attendance of agents from all parts of the country was surprisingly large. It reports dealers from Los Angeles, Denver, Omaha and Portland, Ore., and every



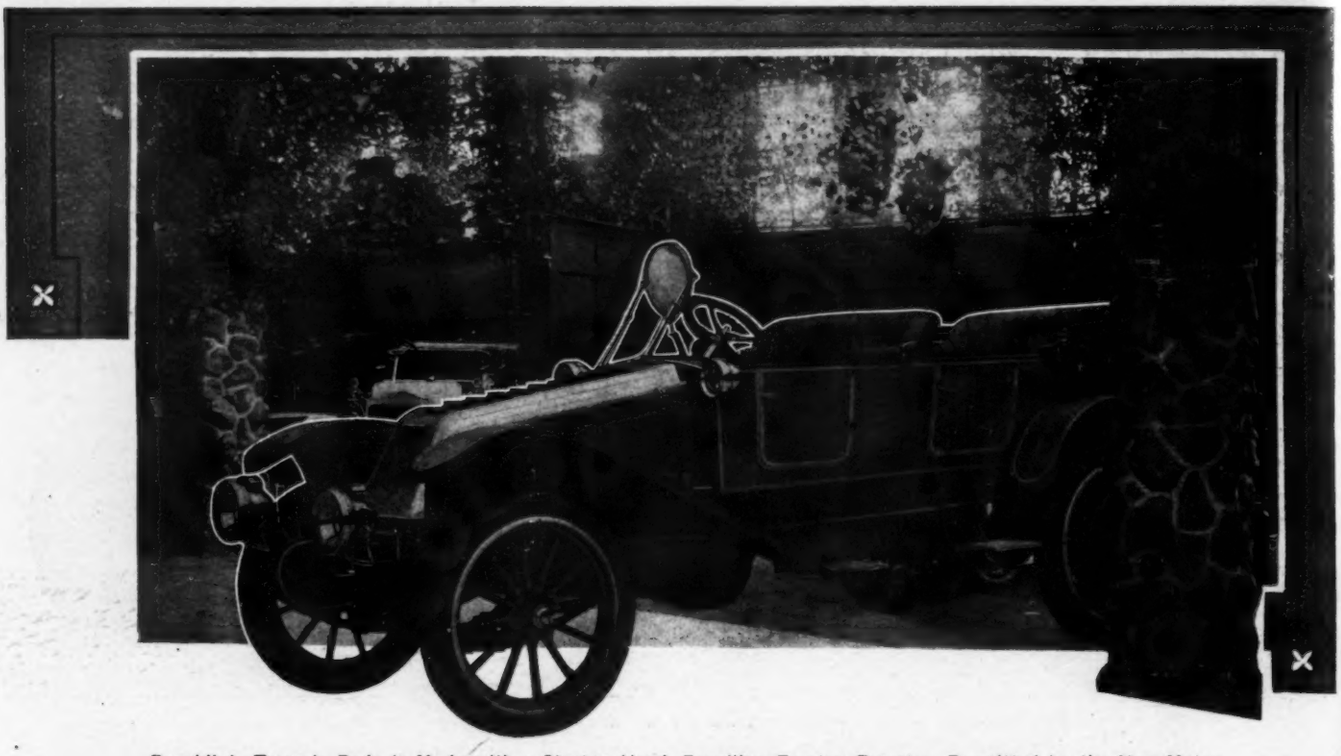
Latest Pierce Six-Cylinder 36-Horsepower Runabout, a Swift and Comfortable Car for Both Business and Pleasure

agent in Illinois was at the show. The foreign exhibitors did well, flattering reports having been received from the Fiat, Renault and Berliet, all of which did a considerable retail business during the show.

A building scheme was sprung yesterday, as referred to above, which promises the construction of a $2,000,000 building, to be devoted to automobile interests only. Those back of the scheme, which is being promoted by the Central Realty and Investment Company, are Lewis M. Stumer, Benjamin J. Rosenthal, Lewis Eckstein and Lee J. Lesser. It is proposed to erect the building on the east side of Michigan avenue, between Twentieth and Twenty-first streets, with a frontage of 307 feet and a depth of 170, the cost to be upward of $2,000,000. It is to be twelve stories high, with foundations and walls to carry six additional stories if found necessary. The twelfth floor will be a roof garden. On one floor will be a convention hall, and in the basement there will be Turkish baths, a swimming pool and a restaurant. It is proposed to fill the rest of the building with automobile dealers, using the eleventh floor for demonstrating purposes, which would make it unnecessary for the occupants of the building to go outside to give their customers a demonstration. However, the fact that some forty local concerns either



One of the Many Designs of Torpedo Bodies Which Have Recently Become Popular; this is the Marmon Creation



Franklin's Torpedo Body is Made with a Sloping Hood, Recalling Foreign Practice, Permitted by the New Motor

have built or are building new homes at the southern end of the row would seem to injure the chances of making this a success.

The show did not end without the Selden patent fight bobbing up, the latter part of the week being marked by a sharp retort from Henry Ford in answer to the warning advertisement of the Association of Licensed Automobile Manufacturers, and an attempt to form an organization of licensed dealers similar to the one started in New York recently. Ford's answer to the A.L.A.M. came out in the Friday morning papers. He made the claim that although the opinion of Judge Hough was filed on Sept. 15, 1909, no injunction has ever been entered against him in the case, nor has any decree been handed down. Ford also states that he still has two chances to fight, one the Court of Appeals and the other the Supreme Court. The delay is said to be due to legal difficulties in changing the name of the Electric Vehicle Company to the Columbia Motor Car Company.

Six-Cylinder American Napier Built in Boston Was One of the Most Conspicuous in the Six-Cylinder Field

NATIONAL LEGISLATIVE CONVENTION IN SESSION

WASHINGTON, D. C., Feb. 16—The New Willard Hotel is the scene of more than usual activity, even considering the many conventions and political gatherings which migrate to the heart of the nation in a year, due to the holding of the National Legislative Convention of the A. A. A., which is headquartered in the red room of the hotel. Numbered among the most prominent of our citizens at the time of the opening were: Vice-President Sherman, Senator Chauncey Depew of New York, the official delegates appointed by the Governors of 20 States and representatives from the 240 clubs which stud the country from Maine to California and from the Gulf to the north frontier.

The administrative staff of the A. A. A. are at the scene of activity in full force, Charles Thaddeus Terry, chairman of the legislative board, being in charge of the campaign, and supported by the immediate efforts of Powell Evans, chairman of the touring information board; S. M. Butler, chairman of the contest board, and George C. Diehl, chairman of the good roads board, is in the midst of the conflict with his coat off and sleeves rolled up. President Lewis R. Speare is making himself of the greatest utility to the cause, benefiting by the far-seeing counsel of vice-presidents R. T. Hooper, Frank N. Joyce and F. C. Donald.

Frederick H. Elliott, secretary of the A. A. A., is kept so much on the go in the performance of his manifold duties that it becomes practically impossible to obtain a comprehensive statement of the progress which is being made, or the results which should reasonably follow this concentrated and wise effort on the part of the A. A. A., to procure sane legislation which will be sufficiently broad in its scope to enable autoists to feel that they are within the confines of their own land when they cross the border of one State into the territory of another.

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

James R. Mann, of Illinois, chairman; Irving P. Wanger, of Pennsylvania; Frederick C. Stevens, of Minnesota; John J. Esch, of Wisconsin; Charles E. Townsend, of Michigan; James Kennedy, of Ohio; Joseph R. Knowland, of California; William P. Hubbard, of West Virginia; James M. Miller, of Kansas; William H. Stafford, of Wisconsin; William M. Calder, of New York; Charles G. Washburn, of Massachusetts; William C. Adamson, of Georgia; William Richardson, of Alabama; Charles L. Bartlett, of Georgia; Gordon Russell, of Texas; Thetus W. Sims, of Tennessee, and Andrew J. Peters, of Massachusetts, members. The clerk of the committee is F. A. Donnelly.

The program for to-day beginning at 10 A. M., was as follows:

"The Motor Vehicle, the Road and the Farmer"—Hon. Nahun J. Bachelder, New Hampshire, Master of the National Grange.

"The Federal Registration Bill"—Hon. Reuben C. Moon, Representative from Pennsylvania.

"Inter-State Intercourse by Motor Vehicle"—Col. Charles Clifton, President Association of Licensed Automobile Manufacturers.

"Motor Vehicle and the Roads"—Hon. Charles P. Allen, Chairman State Highway Commission of Colorado.

"Rights and Duties of Motor Vehicle Users and The Federal Bill"—Osborne I. Yellott, of Maryland.

"Traffic Rules"—William Phelps Eno, of Washington, D. C.

"Speed"—Addison Ely, Jr., of New Jersey.

The afternoon session, which will convene at 2 p. m., will include the following:

"Motor Vehicles and Their Regulation"—Major Richard Sylvester, Superintendent Metropolitan Police, District of Columbia, President International Police Association.

"Principal of Federal Bill, Approved by Bench and Bar"—Hon. Neal Brown, State Senator for Wisconsin.

"The Federal Bill"—Frank G. Webb, ex-President Long Island Automobile Club, Brooklyn.

"The Federal Bill"—S. Boyer Davis, Secretary Automobile Club of Philadelphia.

"Road Improvements in Georgia"—Frank C. Battey, President Savannah Automobile Club.

"Inter-State Roads and Inter-State Laws"—George S. Walker, of Wyoming.

"The Federal Bill—Personal Experiences in Touring"—Claud E. Miller, District of Columbia.

The real hearing before the Congressional Committee will take place on Thursday, February 17. The attitude of the delegates is bounded by the path of wisdom, and the many angles of this important situation are being handled by the foremost advocates of good roads, good ethics, and uniform laws, among which Logan W. Page, Director of the Bureau of Good Roads of the United States Department of Agriculture, is a prominent figure. Walter C. Schutz, of Connecticut, in his address, attracted most favorable notice, and said: "Automobile laws should be based on reasonableness instead of on prejudice." Col. Wm. D. Schier, of Boston, member of the Massachusetts Highway Commission, laid great stress on the necessity of licensing the operators of cars, with power to revoke such license for drunkenness, or the high disregard of the rights of others.

UNITED STATES MOTOR CO. ORGANIZING

This $16,000,000 organization, which was projected with a view to bringing together certain of the older and well-known companies, was reported as including the Maxwell-Briscoe interests and the Columbia Automobile Company, which report was subsequently verified, but details were withheld. Benjamin Briscoe, in a special interview in relation to this matter, authorized THE AUTOMOBILE to announce the fact that the permanent organization is sufficiently under way to bring definite results at a meeting which is imminent, and so far it is safe to say that the board of directors will be headed by Benjamin Briscoe and J. D. Maxwell. Of course, everybody knows Benjamin Briscoe as the president and general manager of the Maxwell-Briscoe Motor Company, and J. D. Maxwell as vice-president, general superintendent and designer of the same company. Mr. Briscoe, in his interview, states most emphatically that any statements other than the above will be without authority, and out of tune with the real situation. Nothing more can happen until the balance of the board of directors is chosen.

"TRUE BLUE" IS DETROIT'S LATEST

DETROIT, Feb. 14—The True Blue Motor Company is the latest entrant in the ranks of Detroit's automobile manufacturers. It is capitalized at $100,000, and will bring out a pleasure car to sell at $1,300, the first of the series being almost ready for the road. Among those interested in the concern are Wallace E. Brown, president of the Michigan Gas Mantle Company; Maurice Wolf, secretary and treasurer of the same company, and Edmund H. Coombs, of the Coombs-Gilmour Company, distributor of the Mitchell car in Detroit.

E-M-F-STUDEBAKER QUARREL SUBSIDING

The report to the effect that negotiations were entered into with a view to the settlement of the squabble into which these companies entered, was denied by the E-M-F Company in total, at the same time the whole situation presents a less turbulent tone, and it is now the general expectation that some wise solution will be arrived at in the near course of events.

LOOKS LIKE PACKARD-KNIGHT CONTROVERSY

KNIGHT GIVES HIS VERSION OF PENDING CONFLICT

LEGAL BATTLE MAY DELAY LICENSES

AN interview in MOTOR AGE of February 10 with a representative of the Packard Motor Car Company stated that it owns basic patents on sleeve-valve engines for the United States, and that the Knight engine is an infringement of Patent No. 12,991, re-issued to Sidney A. Reeve on July 13, 1909. In justice to Knight and Kilbourne I cannot permit it to pass unnoticed.

For a proper understanding of what has occurred, a brief history of the Knight engine, and its success, is essential.

The formal announcement of the adoption of the Knight engine by the Daimler Motor Company of England was made in September, 1908. Within 60 days after this announcement a number of leading automobile manufacturers of the United States had representatives in England to investigate the merits of the Knight engine. One of these representatives was the chief engineer of the Packard company. Through the kindness of the Daimler company Mr. Knight was permitted to take him through its plant and show him every process in the manufacture and testing of Knight-Daimler engines. A sample engine was shipped to the Packard company early in January, 1909, its chief engineer having returned to the United States in December, 1908. Particular attention is directed to the significant fact that, according to the certified copy of the Reeve re-issued patent, Reeve, on February 9, 1909, within less than two months after the return of the Packard engineer from England, and within less than one month after the receipt of the Knight engine, made affidavit to an application for a re-issue of his patent No. 880,824, of March 3, 1908. This must be taken to mean that the Packard engineers were impressed sufficiently to induce action.

Descriptions of the Knight engine have been published. In a word it consists of two telescoped sleeves, both having ports, and each receiving a definite valving motion from an eccentric properly timed according to the four-cycle principle and operated from the crankshaft. Both sleeves slide within the main cylinder which has a fixed head projecting down into the inner sleeve and carrying the spark plug. This head closes both the intake and exhaust ports of that sleeve. The piston performs its usual working stroke entirely within the inner sleeve. During the compression and explosion strokes, the inner sleeve is hermetically closed above by the fixed head and below by the piston, so that the charge is fully compressed without loss, and when the explosion occurs its full force is exerted directly against the piston in a perfectly cylindrical combustion chamber having neither side chambers nor crevices to detract from the force of the explosion or to catch accumulations of carbon, these and divers other advantages must be taken note of.

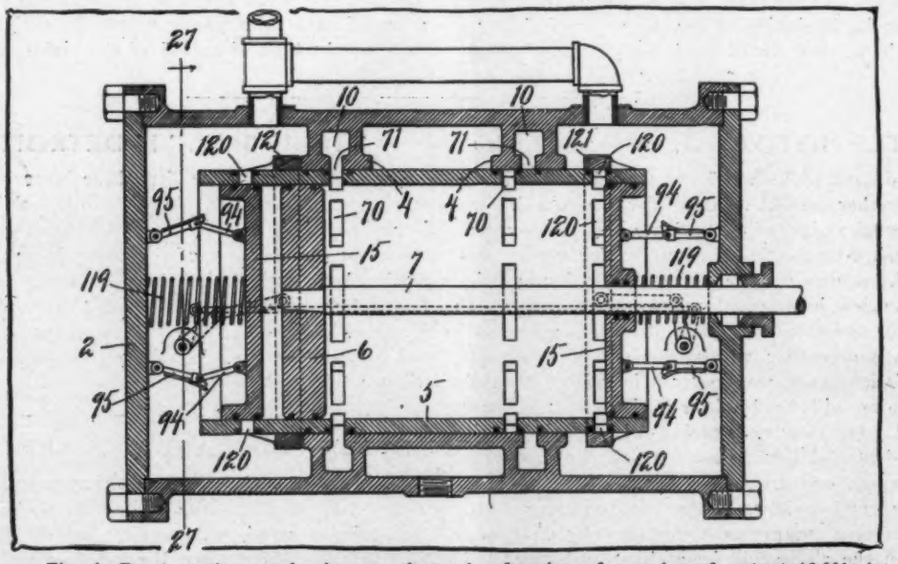


Fig. 1—Reeves valve mechanism as shown by drawings for re-issued patent 12,991, in which the Packard Motor Car Company is interested. Although this is not applied to a standard automobile motor, the principles are said to be the same.

The Reeve device is described as a steam engine of the double-acting horizontal type. Referring to Fig. 1, the piston 6 works in a sliding cylinder 5 arranged in a casing 1, which constitutes the steam chest or "head chamber." This sliding cylinder is not operated by an eccentric or other positive means, like the Knight inner sleeve, but is caused to slide endwise by the friction of the piston, so that when the piston starts to move in one direction, the sleeve will slide therewith and cause its exhaust port 70 in one end or the other to register with one of the exhaust ports 10 in the casing of steam chest to permit the steam to escape from the forward side of the advancing piston. In the outer ends of this sliding cylinder 5, however, Reeve places two piston valves 15, which are adapted to close the inlet ports 120 of the sliding cylinder when a spring 119 behind each piston valve forces it inward and the sliding cylinder 5 is forced towards it by the friction of the piston as the piston moves in that direction. The pressure for moving the piston is exerted between the piston valve 15 and the piston, and during the working and exhaust strokes the piston valve is held from moving outward by a latch device, which is supposed to let go at the proper time during the return stroke of the piston to permit the steam that has been compressed between the piston and the piston valve to force the piston valve outward against the spring and cause the piston valve to slide out from under and again open the inlet port in the sliding cylinder 5.

Reeve shows two forms of his device, one of which is constructed as above described. The other is the same, excepting that he has supplied the sliding cylinder 5 with an auxiliary valve 121 at each end for the common purpose of co-operating with the piston valve 15 in cutting off the cylinder admission more economically than could be done by means of the piston valve alone. This auxiliary cut-off valve is found in the steam engine art in various forms, *i.e.* as piston valve, flat slide valve, ring valve and sleeve. Reeve has chosen the ring form, which he places around each of the protruding ends of the sliding cylinder 5, and which he says he operates from the crankshaft by an eccentric in the usual way, although he does not show the eccentric or operating means.

The combination of elements which constitute the sleeve valve inter-

ial explosion motor were common in the steam engine art years before Reeve's invention, as shown in Fig. 2 by the United States patent of Uren, No. 303,344, issued August 12, 1884, to have the main piston B^2 slide in a sliding cylinder C contained within a casing or main cylinder A and having ports adapted to register with ports in the casing for controlling the cylinder admission and exhaust, the internal sliding cylinder being moved by the friction of the piston, as in the Reeve patent, and it was also old in hydraulic motors, as shown in Fig. 3 of United States patent No. 352,797 of Baldwin, November 15, 1886, to provide the internal sliding cylinder K with an auxiliary cut-off valve 1, 2, 3, 4 encircling each end in the form of a ring and controlling the admission ports, i, i^1 in the sliding cylinder K. In this Baldwin patent these cut-off valves are connected together so as to move in unison by a cylinder W surrounding the internal cylinder K, and both of these cylinders are contained within a main cylinder or casing G having an inlet port Z. The cut-off valves 1, 2, 3, 4 receive definite motion from a valve operating rod N, just as in the Reeve patent. The piston in this Baldwin patent is shown at J, and while it is the main piston, it also serves as two piston valves for controlling the exhaust ports M, M^1 in the internal sliding cylinder.

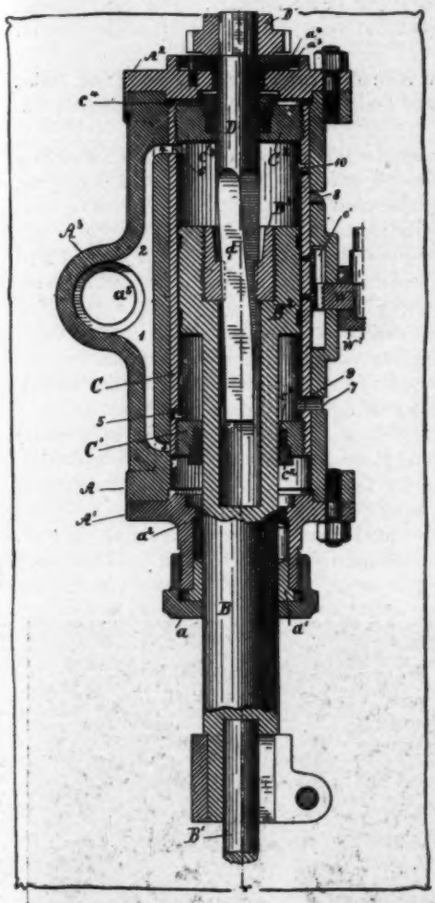


Fig. 2—Uren patent, No. 303,344, which is claimed by Knight interests to conflict with the Reeves patent illustrated above.

The present owners of the Reeve reissue saw and fully appreciated the fact that the Reeve original patent claimed a structure in which no eccentric was employed, and consequently must have claimed the form of the Reeve engine which does not contain the outside auxiliary or cut-off valve. Therefore, when applying for the reissue patent they omitted from the specification the statement of advantages above quoted so as to be able to direct the claims of the reissue to the form of the engine having the outside cut-off valve operated by an eccentric. Consequently, the reissue is for a different invention from that which the patentee intended to cover by the original. The United States Circuit Court at Chicago in the case of Chicago Railway Equipment Co. v. Perry Sidebearing Co., 170 Fed. Rep. 968, has recently settled these questions in a very exhaustive opinion, and this decision has been sustained by the United States Circuit Court of Appeals, and enforced against the reissue even to greater limits. In this decision, the Court said:

Thus it is sought by the language of the reissue claims to broaden the limited claims of the original patent into claims covering the whole field * * *. It seeks to bring within the monopoly of its patent sidebearings not apparently in mind at the time of filing the original application * * *. It can hardly be claimed that the original patent was not a complete device. It was operative just as completely as that of the reissue patent. For all that Wands was seeking, it was in itself a finished sidebearing arrangement. Later he thought he could just as well claim the resilient centering device and make it apply to every friction sidebearing which is centered by a spring. Undoubtedly he made the mistake of not claiming the larger invention, if it be such in his first application; but this is not the mistake the statute and the courts have in mind. (Authorizing the grant of re-issue patents.)

In Campbell v. James, 104 U. S. 356, U. S. Supreme Court said:

When a patent fully and clearly without ambiguity or obscurity describes and claims a specific invention complete in itself so that it cannot be said to be inoperative or invalid by reason of a defective or insufficient specification, a reissue cannot be had for the purpose of expanding and generalizing the claim * * *.

In a further attempt to show that a re-issue must be for the same invention without having its scope or bearing broadened in any particular other rulings may be cited.

The real force of decision is clearly apparent, since Reeve intended by his original patent to cover a steam engine in which there would be no eccentric for operating the valves, whereas in his reissue patent it became necessary to claim the eccentric operated valve in order to establish a color of right to the Knight invention.

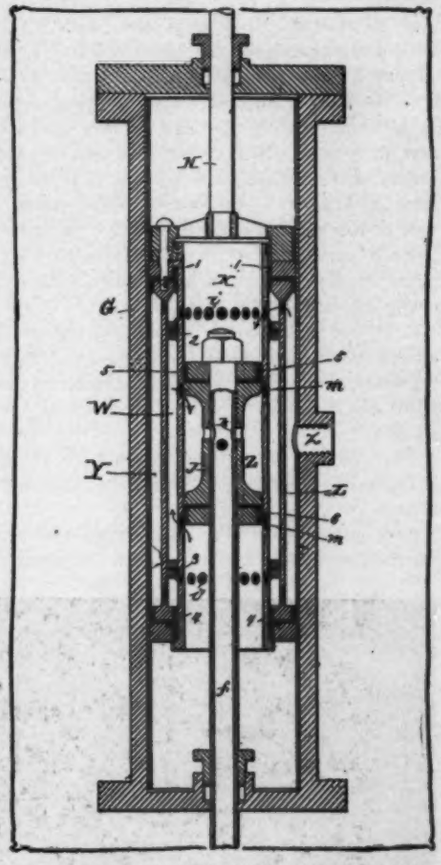


Fig. 3—Baldwin patent, No. 352,797, another valve mechanism resembling that of Reeves and claimed to conflict with it.

In Huber v. Nelson, 148 U. S. 270, the United States Supreme Court held the reissue invalid because it left out one of the elements of the original claims.

In Chicago Railway Equipment Co. v. Perry Co., above referred to, the United States Circuit Court at Chicago, in speaking of the effort of the reissue patentee to enlarge his claim by omitting an element originally described as important in explanation of the situation said:

These two things are vital elements of that patent. Now it is sought by re-issue to drop out the distinctive feature of the patent as described in the claims and substitute another element.

This comment is pertinent because Reeve seeks by his reissue to drop out the statement contained in the original, making essential the form of his engine in which no eccentric is employed for operating the valves, and then to specifically cover this eccentric form by his reissue claims.

The United States Circuit Court of Appeals in New York in the case of Carpenter Co. v. Searle, 60 Fed. Rep. 82, laid down the rule that unless the invention of the re-issue is described as the invention in the original, and that the patentee intended to secure it as his invention in the original, the re-issue is invalid. Other rulings may be cited in support.

(Signed) F. E. Conas,
Attorney for Knight & Kilbourne.

NEW IDEA—POPULAR CAR VOTING CONTEST TROPHY

ANNUAL MIDWINTER NEW YORK TO BOSTON RUN

PERLMAN TROPHY WILL BE COMPETED FOR

THIS contest has been arranged in compliance with the instructions of L. H. Perlman, who desires to open the season of 1910 with a contest that will reflect credit on the trade and invite favorable criticism from the public. The trophy furnished by him at a cost of $500 is to be awarded to the car receiving the greater number of votes cast at the points hereinafter named.

Arrangements have been made with the Hotel Astor to have its dining room open for breakfast at 5 a. m. Saturday morning, March 5, 1910, and the contestants will get away at 6.

Under no circumstances are the speed ordinances to be violated at any time during the day. There are no speed requirements and it is specifically understood and agreed that none will be indulged in, consequently no one will be permitted to pass the pace-making car. Any entrant who passes the pace-making car will be disqualified and must withdraw from the contest.

Each contestant will be provided with a set of flags bearing the name of the car, in large distinct letters that the public may easily discern.

Each car will receive when arriving on the starting line the official ballot box. When reaching a voting station or control the representative of the car must place this box in a conspicuous place, but under no circumstance must he allow it out of his possession.

The controls or voting stations are at the following points: Bridgeport, New Haven, Hartford, Springfield, Worcester and Boston.

Cars must follow the official route and comply with the speed regulations which will not allow of passing the pacemaker.

A contestant must not stay more than 30 minutes in the control or the vicinity. There is no restriction as to the number of passengers, or the method of soliciting votes.

A daily paper in each city which has been selected as a station, will for one week, beginning Monday, publish in its columns the official ballot, none other will be recognized. The daily printed ballot will carry the names of the cars entered up to the time of going to press.

When there is more than one car entered of the same make, each will receive a ballot box, but the votes will be counted collectively.

The polls will be under the jurisdiction of the show committee at Boston who will appoint tellers. Polls will close at 9 p. m. Saturday night. If a contestant has not reached Boston by that hour he will be considered out of the contest.

Each checking or voting station will be under the direction of the referee of that city and his appointment will be made by the paper which is running the ballot. The moment that the show committee announce the winner the award will be made. As a method of determining the relative popularity of the various cars entered, the run should be productive of interesting results. At any rate, it is a distinct novelty among contests.

The violation of any of these rules and conditions particularly as relates to speed will be judged by the referee. An official representative of the contest board of the American Automobile Association will accompany the tour.

Entry blanks for this contest may be had by applying to T. F. Moore, manager of the contest, whose address is 91 West 103d street, New York City.

Notable among the many affairs of the sort which accompanied the Chicago show was the dinner given by F. C. Robie, president of the Excelsior Supply Company, of Chicago, to the salesmen and department heads of his organization. The dinner was held Thursday, February 3, in the clubrooms of the Chicago Automobile Club, of which Mr. Robie is a member. Besides the officers and staff of the home company, practically all of the traveling representatives were present, only two or three being too far distant to attend

NATIONAL LEGISLATIVE CONVENTION AT WASHINGTON

WILL DISCUSS NEEDS OF UNIFORM AUTOMOBILE LAWS

NATIONAL REGISTRATION BILL GIVEN HEARING TUESDAY

STATESMEN, legislators, and prominent automobilists from all parts of the country will assemble in Washington this week for the three days' session of the National Legislative Convention, which will be held in New Willard Hotel on Tuesday, Wednesday and Thursday, February 15, 16 and 17. This convention has been organized and will be conducted under the auspices of the American Automobile Association, and its primal objects will be the securing through national legislation of the Federal Automobile Registration Bill, and at the same time a wider recognition by the various State officials who have been appointed by their respective Governors, of the benefits of the uniform State automobile law.

Coming within a month of the big convention in Washington of the National Civic Federation, which was devoted to the highly important subject of uniform laws, this legislative convention, which will be solely devoted to the needs for uniform and more equable automobile legislation, will be, perhaps, the greatest public demonstration of the sort ever seen in this country towards securing favorable legislation for an industry which has suddenly assumed gigantic proportions in the commercial life of this country, while vitally affecting the comfort and convenience of thousands of individuals.

Invitations extended on behalf of Charles Thaddeus Terry, chairman of the Legislative Board of the A. A. A. to the Governors of all the states in the Union, have met with the most favorable response. Official representatives have been appointed by the Governors of nearly twenty States, in many cases these delegates including the Secretaries of State and the State Highway Commissioners; thereby showing the increasing interest in the subject of automobile legislation and the apparent willingness of the various States to enact harmonious laws. From the automobile clubs throughout the country, as was naturally expected, the response has been highly satisfactory, and the delegates named from scores of clubs, as well as many state automobile associations, include most of the prominent motorists who are well known as earnest workers for the best interests of automobiling.

Secretary Frederick H. Elliott, of the A. A. A., arrived in Washington on Thursday to open headquarters in the New Willard Hotel.

President Lewis R. Speare, Chairman Charles Thaddeus Terry, A. G. Batchelder, chairman of the Executive Committee, and other officials will follow, and by Monday the reception of the visiting delegates will be well under way. The national officials will be aided in their arrangements and reception of delegates by the Automobile Club of Washington, which has appointed a committee of twenty-five to act as the Washington reception committee. President H. Chadwick Hunter, who has taken an active part in working for the success of this convention, will act as chairman of this committee of twenty-five, and his assistants will be John K. Heyl, Elliott P. Hough, W. S. Duvall, Lester D. Moore, Louis A. Dent, William D. West, J. Hamilton Smith, R. B. Caverly, J. H. Falconer, D. J. Dunigan, Fulton R. Gordon, Harrington Mills, A. Ward Evans, Franz Kopp, W. A. Copenhaver, Charles W. Bender, John F. Maury, H. C. Chandlee, W. W. Chiswell, O. J. De Moll, William Muehleisen, Jr., F. H. Edmonds, A. L. Cline.

The opening day of the convention on Tuesday will be mainly devoted to the subject of uniform State legislation in automobile matters, at which time particular attention will be given in the various addresses and discussions to the necessity of enacting uniform laws by the different States in the Union. This is a subject that the national automobile association has been working for during the past half dozen years, and its efforts have been crowned with success in several states. The salient features of the uniform State motor vehicle bill as drafted by Mr. Terry about four years ago have already been adopted by several States, and the benefits that have accrued thereby not only to motorists but to all the users of the highway have been such as to recommend a similar system of uniformity in other States.

President Speare, of the American Automobile Association, will open the convention at ten o'clock Tuesday morning, and he will be followed by Senator Chauncey M. Depew, of New York, who will make the address of welcome. Chairman Charles Thaddeus Terry, of the Legislative Board of the A. A. A, as well as of the National Legislative Convention, will then outline the purposes of the convention, explaining in detail the merits of the uniform State motor vehicle bill, as well as the benefits to be derived by the National Federal Registration Bill. Among the speakers who will follow him discussing different phases of the uniform legislative question will be Senator Rayner, of Maryland; Senator Beveridge, of Indiana; Congressman Dalzell, of Pennsylvania; Secretary of State Rogers, of Connecticut, and Secretary of State Martindale, of Michigan. Among the prominent speakers in the afternoon session will be Logan Waller Page, Director of United States Office of Public Roads; James H. MacDonald, Highway Commissioner of Connecticut; Secretary of State Thompson, of Ohio, and Secretary of State Bailey, of Vermont.

The second day's session of the convention on Wednesday will be chiefly devoted to the Federal Registration Bill, which will be outlined in the discussion by Congressman Moon, of Pennsylvania; President Charles Clifton, of the Association of Licensed Automobile Manufacturers; Hon. Henry B. F. Macfarland, President of the Board of Commissioners of the District of Columbia; Hon. Neal Brown, State Senator of Wisconsin; Frank G. Webb, of the Long Island Automobile Club, and S. Boyer Davis, of the Automobile Club of Philadelphia. Other addresses will be made by William Phelps Eno on "Traffic Rules"; Hon. Charles P. Allen, Highway Commissioner of Colorado, on the "Motor Vehicle and Roads," and Addison Ely, Jr., of New Jersey on "Speed and Its Regulations." Ex-Governor Bachelder, of New Hampshire, will speak on "The Motor Vehicle, the Roads and the Farmer."

To the automobilists of the country who have been working for and are deeply interested in this vital subject of uniformity, the great day of the convention will be on Thursday, the closing day, when the hearing will be held on the Federal Registration Automobile Bill. This bill is already before Congress, having been introduced by Congressman Cocks, of New York, a year ago, and has been referred to the Committee on Interstate and Foreign Commerce, before which the hearing will be held in the Capitol.

The complete list of delegates to date, is:

Delegates Appointed by State Governors

Colorado—Charles P. Allen, Chairman Colorado State Highway Commission; appointed by Governor Shafroth.

Connecticut—Secretary of State Matthew H. Rogers and Arthur Fifoot; appointed by Governor Weeks.

Indiana—Carl G. Fisher and Clarence A. Kenyon, of Indianapolis; appointed by Governor Marshall.

Michigan—Secretary of State Frederick C. Martindale; appointed by Governor Warner.

Maryland—Osborne I. Yellott, of Baltimore; appointed by Governor Crothers.

Vermont—Secretary of State Guy W. Bailey; appointed by Governor Prouty.

Wisconsin—James T. Drought, of Milwaukee, and Capt. William Mitchell Lewis, of Racine; appointed by Governor Davidson.

Wyoming—J. E. Mershon, Rock Springs; Fred. Fisher, Fayette; Elmer Lovejoy, Laramee; George S. Walker, Cheyenne; appointed by Governor Brooks.

Florida—Edward Holder, Jack Camp, J. D. Robertson and R. L. Anderson; appointed by Governor Gilchrist.

Oregon—Dr. C. B. Brown, Portland; appointed by Governor Benson.

Kentucky—George H. Wilson; appointed by Governor Willson.

Delaware—F. Allen Hilles, Wilmington; appointed by Governor Pennewill.

Delegates from A. A. A. Clubs

Colorado—Charles P. Allen, Denver Motor Club.

Florida—T. Edward Bryan and Capt. C. S. Washington, Tampa Automobile Club.

Georgia—John J. Woodside, J. D. Rhodes, R. J. Guinn, Atlanta Automobile Association; F. C. Battey, Savannah Automobile Club.

Iowa—Dr. Harry Pierson Engle, Newton Motor Car Club.

Massachusetts—A. E. Lerche, president, and S. L. Haynes, Automobile Club of Springfield; John P. Coghlin, president, and F. A. Easton, Worcester Automobile Club; W. H. Chase, president, Wachusetts Automobile Club.

Minnesota—Dr. C. H. Kohler, Minnesota State Automobile Association.

New York—S. C. Tallman, president; Hon. Sereno E. Payne, Charles L. Sheldon, Arthur J. Blauvelt, Automobile Club of Auburn; H. A. Meldrum, president, and Bert Van Tuyle, secretary, New York State Automobile Association; Allen C. Alderman, president, Frank G. Webb and Dr. William P. Richardson, Long Island Automobile Club; H. G. Strong, president, Bert Van Tuyle and W. W. Dake, Automobile Club of Rochester; Dr. E. G. Cox, president, and Henry Martin, Albany Automobile Club; William H. Mendel, president, and J. J. Sinnott, Mt. Vernon Automobile Club.

New Jersey—Frank B. Stratford, J. H. Edwards, Dr. Henry Spence, J. V. Z. Anthony, Automobile Club of Hudson County; Dr. J. N. Faulkner, vice-president North Jersey Automobile Club; J. H. Wood, R. A. Greene, C. H. Bissell, New Jersey Automobile and Motor Club.

Ohio—Dr. A. B. Heyl, secretary, Ohio State Automobile Association; C. J. Forbes, Jr., secretary, Cleveland Automobile Club.

Pennsylvania—B. D. Wright, Edward J. Kent, Edward Kneeland and Paul C. Wolff, secretary, Automobile Club of Pittsburg; Hon. William M. Brown, ex-Lieutenant Governor, Hugh Graham and Jere Bauman, Automobile Club of Lawrence County; S. Boyer Davis, secretary, Howard Longstreth and Harrison K. Caner, Automobile Club of Philadelphia; G. Douglas Bartlett, G. Hilton Gantert, Quaker City Motor Club; I. D. Wood, J. E. Mitchell and A. H. Tomlinson, Automobile Club of Delaware County; E. Foster Heller, Wilkes-Barre Automobile Club.

Vermont—W. W. Brown, president, Allen M. Fletcher, Charles C. Warren, Addison Ely, Jr., James Boutwell and S. S. Ballard, secretary, Automobile Club of Vermont.

Virginia—H. H. Trice, Tidewater Automobile Club; J. H. Marsteller, Roanoke Automobile Association; C. B. Richardson, Richmond Automobile Club; William E. Barrett, Peninsula Automobile Club; M. C. Watts, Valley Motor Club.

Wyoming—George S. Walker, Cheyenne Motor Club.

Wisconsin—Hon. Neal Brown and James T. Drought, secretary, Wisconsin State Automobile Association.

Illinois—Dr. W. W. Williams, Quincy Automobile Club; Fred W. Blocki, Chicago Automobile Club.

Connecticut—John N. Brooks, Secretary, Connecticut Automobile Association; Walter S. Schutz, Automobile Club of Hartford.

Kentucky—George H. Wilson, Louisville Automobile Club.

West Virginia—C. N. Brisco, secretary, Monongahela Automobile Club; T. A. Westmeyer, Ohio Valley Automobile Club and State Association; W. T. Carter, Parkersburg Automobile Club; Dr. R. H. Pepper, Huntington Automobile Club.

PREMIER MAKES ENTRY IN FLAG-TO-FLAG RACE

THE first entry for the approaching run from Denver to Mexico City for the Wahlgreen trophy was made recently by President H. O. Smith of the Premier Motor Manufacturing Company. The entry blank was filled out and delivered to George A. Wahlgreen, of Denver, under whose direction the contest will be held. On May 2 it is expected that the tourists will start from Denver and the first car to be sent away will be a Premier driven by Ray McNamara.

Details of the event are being arranged by Mr. Wahlgreen, who has received assurances from so many prominent licensed automobile manufacturers of their support that there seems no doubt but that this interesting contest, which was postponed from last Fall, will actually be held. The Premier interests have felt that this grueling test will be another opportunity to show additional evidences of the ability of their cars and and additional chance to repeat the successes in recent Glidden and other hard contests. About three weeks will be necessary for the machines to make the trip, and in that space of time they will cross part of Colorado, all of New Mexico, part of Texas and run through nine States of the Republic of Mexico. The distance is about 2,400 miles, which is nearly as long as the 1909 Glidden Tour, and much longer than the route for the next A. A. A. event.

MILESTONES FOR THE AUTOMOBILIST

Feb. 14-19.....Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dal H. Lewis, Manager, 760 Main street.

Feb. 14-19.....Hartford, Conn., Foot Guard Armory, Third Annual Show, Hartford Automobile Dealers' Association.

Feb. 14-19.....St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.

Feb. 14-19.....Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.

Feb. 15-19..... Washington, D. C., American Automobile Association's National Legislative Convention.

Feb. 17-19.....Grand Rapids, Mich., First Annual Automobile Show, Grand Rapids Automobile Club.

Feb. 19-26.....Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.

Feb. 19-26.....Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.

Feb. 19-26.....Los Angeles, Cal., Hamburger Building, First Annual Show, Licensed Dealers of Los Angeles.

Feb. 19-26.....Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.

Feb. 19-26.....Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.

Feb. 21-26.....Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.

Feb. 22-26.....Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.

Feb. 21-26.....Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.

Feb. 22-27.....Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.

Feb. 24-26.....Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.

Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.

Feb. 28-Mar. 5....Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.

Feb. 28-Mar. 5....Kansas City, Convention Hall, Fourth Annual Automobile Show, Automobile Dealers' Ass'n.

Mar. 5-12.....Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.

Mar. 5-12.....Cleveland, Central Armory, Cleveland Automobile Club Eighth Annual Show.

Mar. 5-12.....Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Ass'n.

Mar. 7-12.....Albany, N. Y., Armory, Automobile Show.

Mar. 12-19.....Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.

Mar. 17-19.....Louisville, Ky., Armory, Louisville Automobile Dealers' Association Annual Automobile Show.

Mar. 21-30.....Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsman's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.

Mar. 21-28.....Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.

Mar. 26-Apr. 2....Pittsburg, Pa., Dusquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.

Mar. 26-Apr. 2....Montreal, Coliseum, Motor and Sportsmen's Show. E. M. Wilcox, Manager.

Apr. 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

THE AUTOMOBILE

Vol. XXII Thursday, February 17, 1910 No. 7

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

EDITORIAL DEPARTMENT

THOS. J. FAY, Managing Editor
MORRIS A. HALL GEORGE H. GODLEY
W. F. BRADLEY, Foreign Representative

ADVERTISING DEPARTMENT

W. I. RALPH, 1035 Old South Bldg., Boston
C. H. GURNETT, F. W. VAN SICKLEN, T. B. VAN ALSTYNE, Philadelphia — 1200 Michigan Ave., Chicago
LOUIS R. SMITH, New York
H. L. SPOHN, New York
FRANK B. BARNETT, Cleveland
H. H. GILL, Detroit

Cable Address - - - - - - - - - - - - - - - Autoland, New York
Long Distance Telephone - - - - - - - - - - - 2046 Bryant, New York

SUBSCRIPTION RATES

United States and Mexico - - - - - - - - - - - - - - One Year, $3.00
Other Countries in Postal Union, including Canada - - - - One Year, 5.00
To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

Good roads, if they mean anything at all, represent the key to general prosperity. The automobile, no matter what else of good may be ascribed to it, is the greatest influence for advancement of all the devices which men of the last century reduced from a state of chaos, or placed in the hands of workers.

If there are a few minor defects of the automobile, as it is met with on the road, even if a few "road hogs" make things unpleasant on occasions, the fact still remains that the demand for good roads is the surest indication of the intrinsic value of the automobile industry, taking it as a whole. It is useless to try to dam up an ocean; pigmy minds may not be able to project thought for a distance beyond a pug nose, but the industry will go on just the same, and the roads, which are, in all truth, the other half, will be designed and constructed.

That the roads, if they are to be good, will have to be designed, seems to be too true to be disregarded any longer, and when the truth is told it is likely to lay bare the entire absence of designing, considering some of the roads which seem to pound out rather too soon to allow of realizing a fair return on the cost. It is easy enough to say that this high depreciation is due to automobiles, and it may be true that automobile traffic is too much for certain kinds of roads.

Before automobiles came into vogue there was trouble enough with these same roads, and every State had its laws which regulated the width of tires in proportion to the load which weighed them down, and is here mentioned merely to indicate that it is easy enough to forget that the trouble now complained of is the same trouble that obtained for many years, and long before the automobile was in use at all.

Just as it is possible to go back to a time when roads were so bad that no one ever thought of complaining about them, it is now possible to foresee a time when they will be so thoroughly good that there will be no reasonable ground for complaint. For the present it is a matter of education; it is necessary to remove the last vestige of complaint which is so prone to overshadow all else, and this can be accomplished by teaching drivers of automobiles to respect the rights of others, and requesting others to reciprocate.

The automobile shows which are now being held at important centers all over the country are working out the problem of the automobile to a far greater extent than show managers contrived. The shows interest an increasing circle of citizens from year to year, and in view of the merit of the automobile as the servant of the whole people, all that is necessary is to have them come and see—they do come to the shows, and, what is equally to the point, they do see.

Purchasers, when they decry a practice, which to them seems out of step with the spirit of the times, are, more likely than not, on the second lap of a fallacy. In the manufacture of anything, be it a peacemaker for an infant in the shape of a sweetened rag on the end of a string, to the house on wheels which contents the soldier of fortune who seeks adventure in Spain, demand comes first; supply is the answer.

If a maker is trying to foster upon the supporters of the automobile industry, something out of the cloth called by the name shoddy, it must be true that the maker is either without any experience at all, or, experience has shown to him that there are enough shoddy purchasers on the horizon to support the industry. If the maker is mistaken in his notion, if there is no demand for his wares, the receiver will follow him like misfortune after its mate, and the law of supply and demand will be satisfied.

That makers do anticipate demand is not to be denied, and that this idea is a safe one in a sense, is proven; if a certain automobile, after much experience, presents stable characteristics, and the demand for it is constant, it is good practice to examine the sales books, ascertain the strength of demand and take advantage of lowering costs which come from manufacturing on a basis of a steady rate of output.

The antithesis of constant demand and manufacture for stock account is present when purchasers of shoddy characteristics follow the bent of normal inclination and encourage the manufacture of equipment which is not under the restraint of the conventions; the bait being greed; the hope being that something will be had for nothing; the end, like in shoddy cloth, leaves a mesh of entangled rope ends—the part which deceives, like the varnish over the unfaithful automobile, falls to the ground; it may not respond to the expectations of the purchaser, but it cannot escape the influence of gravity.

MOTOR RATINGS DISCUSSED

POWER provides a never-failing source of discussion for the automobilist. No other term in his vocabulary is so misused or misunderstood, or has so many interpretations, and at the same time it is a subject of vital interest, inasmuch as it affects his comfort, his pride or his bank account. It is that quality which makes the difference between passing that other car on the road, and being forced to take its dust; or between climbing a hill in good form, and being obliged to get out and push. Naturally, when he invests a thousand, or several thousand dollars in a car, he wants all the power that his money can buy.

Power, as a technical term, has a very definite meaning. It is defined as the rate of doing work. Work, in turn, is the product of a force and the distance it moves. Thus power is force, times distance, divided by time. It is expressed in units implying these three quantities, as pounds per foot per minute, or kilograms per meter per second. A horsepower is 33,000 foot-pounds per minute; that is, a power which can lift 33,000 pounds one foot in one minute, or one pound 33,000 feet in one minute, or one pound one foot in 1-550 second.

In a gasoline motor power is developed by the burning, and consequent expansion, of the gaseous mixture. The expansion results in a force exerted on the piston head; the travel of the piston on its stroke gives the distance, and the number of strokes per minute adds the time factor. Given the pressure in pounds, the stroke in inches or feet, and the number of strokes or revolutions per minute, the horsepower developed in a gasoline motor cylinder can be readily figured. Although the last two quantities are easy enough to obtain, the first, unfortunately, cannot be had without the use of delicate and costly instruments.

Nevertheless, these instruments, known as indicators or manographs, form part of the equipment of every modern testing laboratory, and valuable results are obtained from their use. On the indicator or manograph card the pressure at every point in the cycle, or in a succession of cycles, is graphically indicated. The pressure on the expansion stroke shows the force which is doing useful work. This pressure is a variable, high immediately following the explosion, and falling off as the piston nears the bottom of its stroke. To make it available for calculation it must be averaged; the average figure, known as the mean effective pressure, is the quantity which, taken with the stroke and the revolutions per minute, will give the power developed in the cylinders, or indicated horsepower.

However, not all of the power developed in the cylinders is delivered at the flywheel. Friction takes a share, in the thrust of the pistons on the cylinder wall, the necessary tightness of the piston rings, the bearings of the connecting rods and the crankshaft journals. More power is lost in driving the valves, the pump, magneto and oiling system. The amount of these losses varies with the construction of the motor; here care and accuracy of workmanship make themselves felt. For motors in good running order the loss is a fairly constant percentage.

To determine the power actually delivered by the motor numerous methods are in use; all depend on the absorption and incidental measurement of the power, as by a friction brake, an electric generator, a water pump or a fan. As the earliest and best known of these the friction, or Prony brake, method may be described. Like all the others, it depends on the definition of power as force times distance, divided by time. The application is quite generally familiar; a brake band or shoe applied to the flywheel, and prevented from rotating with the flywheel by weights on the end of a lever arm. The weight, or the length of the arm, is adjusted until the weight is in equilibrium, tending neither to rotate with the flywheel, or to drop under the force of gravity. The weight then gives the force, the length of the arm the distance, and the number of revolutions per minute the time factor, necessary for calculating the horsepower.

INDICATED HORSEPOWER OF MOTORS

$$\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}$$

$$\text{HP} = \frac{\text{Force (lbs.)} \times \text{Distance (ft.) per min.}}{33{,}000}$$

Force = M.E.P. (lbs. per sq. in.) x Area of piston (sq. in.) x No. cyls.

Distance per minute = Stroke (ft.) x ½ Revolutions per minute

$$\text{Indicated HP} = \frac{P \times A \times N \times S \times R}{66{,}000}$$

STROKE, REV. AND PISTON SPEED

	R.P.M.						
Stroke.	900	1000	1100	1200	1300	1400	1500
3½....	525	583	642	700	758	817	875
3¾....	562	625	687	750	812	875	937
4	600	667	733	800	867	933	1000
4¼....	637	708	779	850	921	992	1062
4½....	675	750	825	900	975	1050	1125
4¾....	712	792	871	950	1029	1108	1187
5	750	833	917	1000	1083	1167	1250
5¼....	787	875	962	1050	1137	1225	1312
5½....	825	917	1008	1100	1192	1283	1375
5¾....	862	958	1054	1150	1245	1341	1436
6	900	1000	1100	1200	1300	1400	1500

Brake horsepower, as the figure thus obtained is called, is usually regarded as the best standard for judging the ability of an automobile. However, in order to determine the power actually available for driving the vehicle, it is necessary to gauge the power delivered at the rear wheels; for there are losses in the transmission from the flywheel to the drivers, just as there are in the transmission from the cylinders to the flywheel. Horsepower at the rear wheels may be measured by a Prony brake, or by the other forms of testing devices mentioned, just as power at the flywheel may be measured.

No form of brake horsepower lends itself to a method of rating; obviously the only way to measure brake horsepower is to perform the actual test. To get a rating by which the power can be estimated without an actual test, or even before the motor is built, it is necessary therefore to go back to the less desirable form, indicated horsepower. The quantities needed for the calculation are here the area of the piston head on which the pressure acts, easily obtainable from the cylinder bore; the

number of cylinders; the stroke of the pistons; the speed in revolutions per minute at which the power is to be figured, and the mean effective pressure. The last is the only one which offers any difficulty.

Of course it is just as impossible to predict exactly what will be the mean effective pressure of any motor, as it is to predict what weight its flywheel will balance on a five-foot lever arm; but it is possible to take an average figure for the mean effective pressure which will be a reasonable expectation, given detail design and workmanship up to the standard. For this purpose the mean effective pressures of a number of well-known motors have been worked out from their known performances, and are given herewith for reference. It will be noted that the powers used in deriving these figures are all brake horsepowers, and that the mechanical losses between the piston heads and the flywheel have been ignored. The actual pressures must in all cases be sufficiently higher than those given to balance these mechanical losses. Therefore, if the expectations of the power to be developed by a suppositious motor are based on these figures, the expectations will be in terms of brake horsepower rather than indicated horsepower, which is exactly what is wanted.

The figures quoted for mean effective pressure range, it will be observed, from 70 to 100 pounds per square inch. The latter is the pressure attained by the English Daimler motor with the Knight sliding-sleeve valve system, and is one of the highest ever reached on a stock motor. The examples show, further, that the

BRAKE HORSEPOWER OF MOTORS

$$\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}$$

$$\text{Horsepower} = \frac{\text{Force (lbs.)} \times \text{Distance (ft.) per min.}}{33{,}000}$$

Force = Weight (lbs.) applied on lever arm
Distance per minute = 2π Length (ft.) of lever arm x Revolutions per minute

$$\text{Brake HP} = \frac{2\pi \times L \times R \times W}{33{,}000}$$

mean effective pressure for any motor is by no means constant. If it were, the power curve of that motor would be a straight line, showing variations in power exactly proportional to those in speed. As a matter of fact, the pressure falls off with an increase of speed over a certain point, determined, of course, by the peculiarities of the individual motor. Figures on the Daimler-Knight motor show a pressure of 100 pounds at 1,172 revolutions, whereas at 1,500 revolutions the pressure is but 93.9 pounds, this in spite of the admitted fact that the Knight valves are better adapted to high speeds than poppet valves.

It must not hastily be assumed that the excellence of a motor is shown by its mean effective pressure; the designer's intentions should be considered. A high-pressure motor is naturally subject to more severe strains and stresses than a low-pressure one, and, other things equal, may be considered shorter lived. The question of flexibility also enters largely. To secure high compression, and consequent high pressure at high speed, the initial compression may be made so great that the motor will not throttle down. This is often seen in racing motors.

In devising a rating formula from the formula given for indicated horsepower, it is first of all necessary to assume arbitrarily a figure for the mean effective pressure, as this is the most dangerous variable quantity to be reckoned with. Most formulas take 70 pounds as the average; a figure conservative, but not unjust. Secondly, the speed must be assumed. A formula

DERIVATION OF A. L. A. M. FORMULA

$$\text{Indicated HP} = \frac{P \times A \times N \times S \times R}{66{,}000}$$

Assume P (Mean Effective Pressure) = 70.
Assume piston speed is a constant = 1,000 ft. per min.;
then $2S \times R = 1{,}000$, and $S \times R = 500$

$$\text{Ind. HP} = \frac{70 \times \frac{1}{4}\pi D^2 \times N \times 500}{66{,}000} = \frac{D^2 \times N}{2.4}$$

$$\text{A. L. A. M. HP.} = \frac{D^2 \times N}{2.5}, \text{ for convenience in calculation.}$$

often favored is horsepower = one-tenth the piston displacement, in cubic inches. For a four-cylinder 5 by 6 motor, in which the piston displacement is 471.2 cubic inches, this gives a rating of 47.1 horsepower. A moment's calculation will show that this formula is based on the assumption of 70 pounds as the pressure, and 1,131 revolutions per minute as the speed, or of other figures in proportion.

The formula in widest use is that known in this country as the A. L. A. M., and in England as the R. A. C. This differs from the preceding in that the second quantity assumed is not revolutions per minute, but piston speed. If, as before, 70 pounds is taken as the pressure, the piston speed will be close to 1,000 feet per minute. Corresponding speeds in revolutions, for motors of a given stroke, may be obtained from the table. In the table of pressures one figure for each motor is at the speed at which the motor should develop its A. L. A. M. horsepower; the justice of the assumptions may be deduced from these figures.

The value of any horsepower formula depends, therefore, on the accuracy with which its assumptions fit the motor in question. The A. L. A. M. formula obviously does not fit the Daimler-Knight motor, which develops 58-horsepower under the conditions which by formula should give 38. For the great majority of motors it comes close to the facts; a few may even be flattered. In view of the popularity of testing laboratories, the usefulness or desirability of formulas seems limited. Under any circumstances, the only real way of determining the horsepower of a motor is by a brake test. More and more popular among the manufacturers is the practice of stating in their catalogs the actual brake horsepower developed by their motors at a given speed; unless the speed is stated, however, such figures are valueless. An authenticated test is always worth any number of formulas to the automobile buyer.

MEAN EFFECTIVE PRESSURES

(Disregarding Mechanical Losses)

Make.	Cylinders.	H.P.	R.P.M.	M.E.P.
Daimler	Four 124x130mm.	58.0	1,172	106.8
National	Four 5x5 11/16 in.	64.0	1,400	81.1
National	Four 5x5 11/16 in.	54.1	1,055	90.9
Pierce	Six 4x4¾ in.	44.5	1,263	76.1
Pierce	Six 4x4¾ in.	30.9	800	85.4
Rambler	Four 5x5½ in.	43.5	1,091	73.1
Rambler	Four 5x5½ in.	40.0	900	81.3
Rambler	Four 4½x4½ in.	34.0	1,333	72.2
Rambler	Four 4½x4½ in.	29.0	900	89.2
Thomas	Six 4¼x5½ in.	49.0	1,091	76.0
Thomas	Six 4¼x5½ in.	34.5	700	83.4

MAKERS of automobiles, when they desire to determine definitely the power which may be taken from the motors after they are produced, resort to the use of a dynamometer of some sort, and, in the absence of just a little practice, are likely to adopt the most simple form of Prony brake, primarily on account of its low first cost, then in view of the small amount of time required in rigging it up, and finally with the hope that it will suffice for the purpose.

Experience with this simple form of measuring device leads to the conclusion that, while it may be suitable for emergency use and will serve a certain crude purpose, it is not, by any means, an instrument of precision such as may be relied upon in these days, considering the exacting requirements of automobile motor testing, especially if account is taken of the high rotative speed of automobile motors.

In testing an automobile motor for power and flexibility, there are conditions as follows to be satisfied:

(A) The motor must be run in; the bearings must be brought to a state of well being, and the parts must be limbered up.

(B) A test to determine maximum load must be run, and in order to realize an advantage from this effort, it is necessary to prolong the run for a sufficient time to determine if the motor will perform continuously at the maximum load.

(C) The next point is to ascertain, by a run of sufficient duration at low speed, if the motor will heat up; if the radiator is of adequate capacity, and if the flywheel is heavy enough to afford all the advantage that can be induced in this way.

(D) Flexibility is the next point to be fixed upon; a motor may perform well at the two limits of speed and be absolutely lame at some intermediate speed. The best way to ascertain if this desired condition is present will be to run a test at equidistant points in the speed range, and plot a curve to show torque for speed.

There is no form of simple Prony brake that will allow of tests such as these, and, unless these tests can be made, it is doubtful if there is any use of going to the trouble and cost of rigging up to make any test at all. A practical man, in the absence of a Prony brake, will be able to tune up a motor so well that he will be able to judge its performance in a general way, and he will get along just as well without the crude device above mentioned as he will with it.

EFFICIENCY OF DYNAMOS

Dynamos or motors, as used in testing automobile motors, must be calibrated. The losses must be determined:

(A) Bearing, friction, and windage losses.
(B) Loss in brushes due to friction.
(C) Loss due to hysteresis and eddy currents.
(D) Loss due to foucault currents.
(E) Loss due to armature resistance at the several loads.
(F) In separately excited machines the field (winding) losses do not count.
(G) Since it takes approximately five hours to heat a dynamo or motor to its maximum under full load, it follows that any testing done by means of such a machine, to be accurate, must allow for temperature increase or the test must be conducted after the dynamo or motor is heated up to the maximum.
(H) Measuring instruments, as volt, ampere and watt meters, must be calibrated at frequent intervals, and always before and after an important test. A double set of instruments will add materially to the accuracy of all such tests made.

DYNAMOMETER METHODS EMPLOYED

In many automobile plants where motors are made in quantities, the run-in test is regarded as a necessity, and it is a simple expedient to attach a fan to the crankshaft, in place of a clutch, and, if the fan is properly devised, it will limit the speed of the motor to that which should obtain in actual service when the motor is doing its accustomed work. The fan requires no attention, it offers a constant resistance so long as the speed of the motor is maintained constant, and, if speed changes do creep in, they will indicate that some adjustment is necessary, either to the carbureter or the sparking equipment, but there will be no damage done even if the adjustments are not made. This form of dynamometer is economical, it takes up almost no added space, and it is, in first cost, at the bottom of the list. In some instances the fan dynamometer has been fitted out with a tachometer, by means of which the speed is counted, and by previously calibrating the fan, the power delivered may be noted by ascertaining the speed and comparing it with a chart of power for speed as determined by a previous calibration.

The fan dynamometer may be used to note the effect of maximum load, provided the speed of the motor is maintained at the point which will cause the fan to load the motor, and the endurance of the motor under conditions of maximum load may be noted. For the minimum load, it is not practicable to employ the fan unless it is so designed that the blades may be shifted to offer just the amount of resistance to rotation which will afford the minimum load under conditions involving the best fuel mixture.

It is at this point that the fan falls short of the best requirement; it depends, for result, upon speed. When it is desired to ascertain the range of power of a motor at a given speed, which range is then brought about by changing the quantity and character of the mixture, the fan dynamometer fails to serve the purpose.

TESTING DEMANDS USE OF FLEXIBLE DYNAMOMETER

It is this condition of flexibility which must be given the greater amount of attention, although it is of the greatest importance to ascertain if the parts, as crankshaft, connecting rod, piston pin, and bearings, will sustain under conditions of maximum load and when the speed changes violently. To be able to determine flexibility, it is but a matter of employing a suitable dynamometer, of which there are types to be had as follows:

(A) Dynamo electric machine, to be driven by the motor to be tested; the output to be absorbed by a suitable rheostat.

(B) Electro-dynamometer, which differs from the dynamo test to the extent that the torque is exerted on a lever-arm which is secured to the field (frame) of the dynamo, and by measuring the pull in pounds, considering the length of the lever, the power of the motor to be tested may be determined.

(C) Hydro-dynamometer, which is made up of a disc, or a

FORMULA OF PRONY BRAKE

$$\text{H.P.} = \frac{2\pi R S P}{33{,}000} = \text{brake horsepower.}$$

$$R = \frac{\text{H.P.} \times 33{,}000}{2\pi S P} = \text{radius of arm in feet.}$$

$$S = \frac{\text{H.P.} \times 33{,}000}{2\pi R P} = \text{speed in r.p.m.}$$

$$P = \frac{\text{H.P.} \times 33{,}000}{2\pi R S} = \text{pull on lever.}$$

plurality of discs which are rotated at high speed in a water bath within a suitable housing.

(D) Balanced electric system of testing, which comprises a plurality of separately excited electric machines, they being capable of operating as dynamos or motors, at the will of the operator. Control is by use of suitable field rheostats, by means of which the fields of the machines are altered as to strength at will; if the field is weakened the machine will deliver a lower voltage, and it will then be driven, as a motor, by the mate to it, which will run as a dynamo.

In a plant where a large number of automobile motors have to be tested in, the balanced electric system has many advantages. There may be any number of sets of these machines; all that is required to satisfy the conditions is to have the machines in pairs, referring to the electrical relation; in this way one machine (of each pair) is driven as a dynamo, which furnishes current to the other, which, as a motor, drives the motor to be run in. The dynamo, of course, loads the motor, and it furnishes the power, which is electrically transmitted, to drive the second motor, which is being run-in during this period of time. Since the conditions may be reversed at will, the operator simply manipulates the change-over switch as conditions indicate the necessity.

Electrical instruments, placed on a convenient board together with all necessary switches, tell of the power which is delivered by the first motor of a pair in driving the dynamo, and the electrical energy which is converted to mechanical work, tells of the power requirement in running in the second motor of the pair; there may be any number of sets of this equipment in a test room, and a single operator can handle possibly 20 sets. This method eliminates rheostats, lamp-banks and other troublesome features, and it has the virtue of being economical as well as flexible.

There is still one other possibility; if the automobile motors to be tested are connected to pumps (of the centrifugal type), and the pumps in turn are connected, by piping, to a reservoir, the power required to pump the water to the reservoir may be adjusted to equal the ability of the motor to be tested, and the work done in the process may be turned to good account—the water stored by this process in the reservoir may be used for fire and other purposes around the plant. This method of testing has the virtue of being both stable and flexible, and the only point which would have to be taken into account as being a possible obstacle, is, the water pumped would have to be turned to good account or the work done by the motors being tested would be wasted just as it is now in the other methods of testing.

It will be understood that the motor-testing question has other angles besides the one which is being considered here; investigation of the internal conditions, requiring the use of a manograph, is one phase of the subject. Brake tests, however, are made after the motor is finished, and when the designer has concluded all other investigations.

When the brake test is concluded, it is then proper to go into the question of the relation of the motor to the car; this involves the gear ratio, speed changes, power required to propel the automobile, hill-climbing ability, and performance when the going is bad. Very many satisfactory automobiles may have been investigated only to find that the motor was not capable of driving them as fast as they would have to go to satisfy the gear ratios established.

The remedy, in a case of this sort, lies in increasing the gear ratio; this will allow the motor to speed up to a higher point considering the speed of the automobile, and, as might be expected, will have the effect of lowering the speed on the level, but the ability of the motor will be in better keeping with the requirement when the automobile is making a hill or is down in the mud and the demand is maximum.

If a dynamometer test permits of determining the torque of the motor at its different speeds, it does not help to determine the torque requirement as indicated by the automobile on the road, and it is this condition which indicates that a certain amount of power is needed at each speed; the motor must be capable of delivering this power at the speed as fixed by the gear ratio.

The character of motor to use depends upon the character of the service demanded; it is not the same in touring work as it is in racing, and flexibility of the motor is what is wanted in touring, just as in racing maximum speed is the main requirement. It is especially difficult to so design a motor that it will give the last "drop" of power at a very high speed, and, at the same time, realize flexibility to a degree.

Flexibility comes when the motor is especially designed for just this property, and, when characteristics of motors are being discussed, it is necessary to consider the work which is to be performed when the merit of the motor is being fixed upon.

The probabilities are that the most flexible motor will be the one with a high mean effective pressure relative to the maximum explosive pressure, and especially if the torque is represented by a straight line throughout the range of speed as it is fixed by the gear ratio and the ability of the motor, considering the power required by the car.

COMPUTING LOSSES IN CALIBRATION.

$$\text{Efficiency} = \frac{\text{output in watts}}{\text{input in watts}} = \frac{\text{output}}{\text{output} + \text{core loss} + \text{copper loss} + \text{friction} + \text{etc.}}$$

Characteristics of the losses:

(A) The core loss, which is made up of the hysteresis loss and eddy current loss remains constant at a constant potential.

(B) The copper loss changes as follows:

$W = I^2 R$; $\frac{E^2}{R}$; measured in watts.

Considering the machine as a motor:

(C) $I = \frac{E - e}{R}$ = current in amp. input.

(D) $W = E \frac{E - e}{R}$

(E) $w = e \frac{E - e}{R}$

RELATION OF POWER TO SPEED

CONCEALED within the problem or the interrelation of power, weight and speed are a number of smaller, lesser, but nevertheless important minor matters. These, although slight, have enough of a bearing upon the main problem to necessitate a careful consideration. The whole subject, in fact, is one of such close interrelation between the several components as to require close study to secure a firm grip on it.

So it will be well to look into the subject as a whole. The prime source of speed is, of course, power. The development of this has been covered previously, as well as its accurate determination or measurement. When it comes to use, however, another question enters, namely, the matter of efficiency of the transmitting members. This is determined as much by the design and location of the members themselves as by their bearings.

Without going into the former, the latter may be expressed in tabular form. Thus there are several forms the transmission of power between the engine and road wheels may take. The following might be mentioned: Bearings, plain, taper, roller, ball; shaft drive means either bevel or spur gears, of which there are several kinds, while chain driving introduces another variable. Tabulating these and the losses which their use entails, all of the figures being for a single unit of the kind mentioned, the table below is obtained. To care for the figures in the case where more than one of each kind of unit is used, simply multiply by the number used.

POWER LOSSES FROM VARIOUS SOURCES

Source of Power Loss	Amount of Loss Per Cent	Efficiency Per Cent
Plain Bearing	2 1-2	97 1-2
Taper Roller Brg	1-4	99 3-4
Annular Ball	1-8	99 7-8
Universal Joint	4	96
Roller Chain	2	98
Silent Chain Hor	2	98
Silent Chain Vert	4	96
Spur Gears— Steel Greased	9	91
Spur Steel Pinion— Fiber Gear	11	89
Spur Rawhide Pinion— C. I. Gear	12	88
Spur Steel Oil Bath	7	93
Bevels Steel Oil Bath	11	89

This table gives a clear idea of how the power is lost between its generation in the cylinders of the engine and the tire surfaces where it becomes of use. Some idea of this total loss may be gained from the simple statement that the whole efficiency, considering every member and every bearing, is taken as 70 per cent. This is to say, that 30 per cent. is lost through the various small items, given in detail in the above table.

Between the surface of the tires and the road surface, or metal, as the English call it, there is a sort of bond of union, which is called adhesion. This is due in part to the action of gravity pressing the load above down onto the tire so that the latter must adhere fairly close to the road surface, and in part to the natural adhesion of rubber, although smooth to the rough road. Adhesion as a physics term is defined as the molecular connection of bodies in contact. This expresses the exact idea. The car standing on the road, so that the tires are in molecular and intimate contact with it, causes the rubber to adhere to it. The influence of gravity being a constant quantity is at some times a detriment to speed, which is but the instantaneous removal of parts from adherence, only to permit new and instantaneous adherence to take place at an advanced point.

There is, then, a continual breaking of old bonds and a making of new. The rate at which these are broken and remade determines the speed, the making depending mostly upon the weight of the vehicle, while the breaking of them depends solely upon the amount of power supply and the method of its use. This adhesion is a variable, and as yet not exactly determined quantity, but for all ordinary computations it is taken as 148 pounds per ton.

Against speed driving and, in particular, against high speed, the road surface offers a resistance of its own. This is irrespective of other conditions of tractive force, of adhesive effort or any one of the other items which enter into the complex problem. It is another quantity which has not been determined with a positive and certain accuracy, so must be taken as about 50 pounds per ton of actual weight of vehicle. It is an actual resistance, which must be overcome by the power which is at hand, and therefore a subtractive quantity considering the power alone.

To mention another subtractive quantity, the wind. The resistance of the air to the swift passage of any body is very great. fully as great as the force of the wind moving at the same speed against the stationary vehicle, action and reaction being equal. That this is not a negligible quantity is best expressed by the statement that electric trolley car builders found that straight front cars could not be used for speeds above 60 miles per hour. For very high speed work it was found necessary to so shape the front as to "cut" the air, making its entrance easier. While this does not actually reduce the cross-section, or area of the body,

RELATION OF WEIGHT AND SPEED

$$\text{Energy} = \frac{\text{Weight} \times \text{Velocity}^2}{2 \times \text{Gravity}} = \frac{W \times V^2}{2g} = \frac{W V^2}{64.4}$$

Taking a velocity of one mile per hour

$$\frac{5{,}280 \text{ ft.}}{3{,}600 \text{ sec.}} = 1.466 \text{ ft. per sec.}$$

V equals miles per hour times 1.466,
So, V^2 equals V^2 (m. p. h.) x 1.466,
Substituting:

$$\text{Energy} = \frac{1.466}{64.4} W V^2 \text{ (m. p. h.)} = .02276\, W V^2 \text{ (m. p. h.)}$$

Thus, if a car weighs 4,000 pounds, at 20 miles per hour its energy of motion is: .02276 x 4,000 x 20^2 or, 36,416 foot pounds.

On the other hand, a car weighing but half of this or 2,000 lbs., running at the same speed, has an energy of motion of: .02276 x 2,000 x 20^2 or 18,208 foot pounds, just half the previous case.

The effect of speed is much greater than that of weight. Suppose the speed be twice that of the first case, or 40 m. p. h. Then: the energy is .02276 x 4,000 x 40^2 or 145,664 foot pounds, four times as much as before. The conclusion, then, is that doubling the weight doubles the energy of motion or inertia, while doubling the speed quadruples the energy of motion. Excessive speed, then, possesses twice the menace to life and limb that very high weight does.

RELATION OF WEIGHT TO POWER

Let W equal weight of car, P equal power, E equal the efficiency of transmission, that is back of engine and up to but not including tires on road, V equal the speed in miles per hour, K the coefficient of adhesion of the tires, of the efficiency of contact between tires and road surface.

Then, the maximum power which can be supplied, a further application resulting in slippage, is:

$$P\,(Max) = \frac{88 \times W \times V \times K}{33{,}000 \times E}$$

That is, expressed in words, the power necessary or maximum is equal to the inertia of the moving body times its efficiency of contact with the road surface, reduced from foot pounds to horsepower, and divided by the efficiency between the engine and the tires.

To take a numerical example of this, let the weight of the car be 4,000 pounds as before, the speed 40 miles per hour as before. Now the weight on the driving wheels is never more than six-tenths (.6) of the total weight, so the weight to be substituted in the formula is .6 x 4,000 or 2,400 lbs. The efficiency of the transmission from engine to wheels may be taken as 70 per cent. By experiment it has been found that a fair figure for the efficiency of tire adhesion is 60 per cent., substituting in the formula:

$$P = \frac{88 \times 2{,}400 \times 40 \times .6}{33{,}000 \times .7} = 219.4 \text{ horsepower.}$$

by making its entrance and exit easier, brushing aside the resisting air, so to speak, the speed was found to be greater. Not only was a higher speed permitted, which previously was impossible, but this was done with a lower expenditure of power than before. The back of the car received as much attention as did the front, for it was figured that if the resistance in front was so great there must be a tremendous suction behind. That this was actually the case was shown by the speed which the cigar-shaped electric cars of the German railways attained, 127 miles per hour, with a comparatively modest power plant.

This point was well accented by the experiments of S. F. Edge with a Napier car at Brooklands track in England. In the tests a six-cylinder car of 38.4-horsepower was used, upon the front of which had been erected a framework. This had for a facing removable laths which were added to or reduced in successive experiments. The actual speeds made with the varying sizes of frontal area were as follows:

EFFECT OF FRONTAL AREA ON SPEED

Area of Screen	Time Seconds for Quarter	Speed Miles per Hour
30	18.4	47.85
28	18.0	50.0
26	17.0	52.9
24	16.0	56.2
22	16.6	54.0
20	16.2	55.5
18	15.8	57.0
16	15.6	57.6
14	15.0	60.0
12	14.4	62.5
10	14.0	64.2
8	13.6	66.2
6	12.8	70.3
4	12.0	75.0
2	12.2	73.8
None	11.4	79.0

This table explains more clearly than words the effect of an adverse head wind. If it be considered that the engine developed its maximum, and therefore the same power in every one of these cases, the very large loss in power due to wind resistance may be noted, the difference in the speed between full screen and no screen being no less than 65 per cent. This expressed in terms of the ordinary power plant would mean the difference between a 25-horsepower unit and one of 42 horsepower.

This, of course, was by way of an unusual addition to the usual frontal area, and one that would hardly ever be met with in ordinary work, but it serves to show the very marked influence of a quantity ordinarily neglected. Makers of racing cars should give this point as much attention as is given to the refinement of power plants, because this economizes power. Except for a few sporadic attempts on the other side, and the Baker "Teakettle," this is a carefully neglected point. It is worthy of mention that the latter astonished the world with its performences on the Florida sands some few years ago. The credit was given, however, to the unusual power development of the engine, rather to the non-air-resisting qualities of the peculiar body shape, which economized on the power output.

For all ordinary cases of figuring out power for any given case, the frontal area is taken as 15 square feet, but cases have been known in which this has been reduced to 12 square feet without affecting any other part or function of the car as a whole. This seems like but 3 square feet, but it really is a subtractive quantity of 1/5 or 20 per cent. In the Edge experiments, tabulated above, the first 20 per cent. reduction in frontal area increased the speed or power if you wish it, by 17.4 per cent., while a second reduction of any equal amount increased the speed or power by less than 2 per cent. It is apparent from this, then, that the first reduction is by far the most important, and carries by far the greatest weight.

To propel the car at a high speed, or better, at a very high rate of speed, the necessary tractive adhesion falls off somewhat rapidly, the more so than the speed increases. This may be noted from a careful inspection of the various formulas given elsewhere on this page and the opposite one. At slow speeds, and for starting purposes, high tractive adhesion is a positive necessity. This really is a fortunate circumstance, if it may be called that, being one of Nature's immutable laws, for at high speeds, the tire tread is in poor contact with the road, due to its own and the road's irregularities, which keep it bumping into the air a goodly portion of the time. The need is thus apparent for high tractive adhesion for ordinary uses, for starting, and for running at slow speeds, but at high speed, that is, for racing work, the law allows of "weight paring." More than the fact that the latter is not a necessity, it becomes a duty to take as much of the weight as possible from the tires, for these have come to be the real stumbling block in the way of excessive speed. Not that the tire makers have not done their part—for they have done very well—but the nature of the service is such that no delicate fabric could be expected to withstand it. This is a trying situation, and one which the tire companies are making efforts to cope with in a manner similar to the tire situation.

AIR AND TRACTIVE RESISTANCES

Air resistance enters as follows: Power is reduced by the resistance to traction, to the force of gravity tending to hold the car stationary, and by the resistance of the air. This is expressed in the formula:

$$V\,(Speed) = \frac{P \times E \times 375}{(T_r + G_r) \times W + A \times R_a}$$

In which, P is the actual power, E the efficiency of transmission, T_r the tractive resistance, G_r the resistance due to gravity, W the total weight, A the frontal area, and R_a the air resistance, which is found by $R_a = V^2\,(m.p.h.) \times 1.466 \times .0017 = V^2 \times .00249$.

SOLUTION OF RADIATOR TROUBLE

Editor THE AUTOMOBILE:

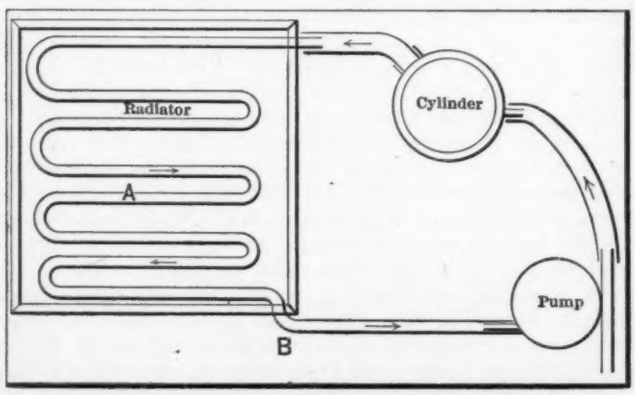
[2,168]—Should the outlet elbow on the bottom of the radiator be as large as the circulating tubes in the radiator? I derive much help from your answers to "Letters" about automobile troubles, and hope that you can help me. I have a Northern two-cylinder, 5 1-4 by 5 1-4 car, with which I have always had considerable trouble from overheating. The water boils and steams more or less all of the time. In putting on new hose connections the other day, I noticed that the brass elbow outlet on the bottom was very much smaller than any of the other pipe connections on the top, either to the pump or to the cylinders. When the radiator was steaming and boiling at the top, I placed my hand on the small outlet and found it to be barely warm. It occurred to me that the water could not flow fast enough through this reduced outlet to circulate the water to the pump as fast as the latter could handle it. The pump does not suck the water to it but merely circulates the water it receives. Would you recommend putting on a larger outlet? I enclose a sketch showing the connections.

Newark, N. J. R. E. HEINISCH.

As the letter is understood, the outlet referred to is marked B in the appended sketch. This would probably be of a smaller size than the inlet at the top of the radiator, where the heated waters enters, on purely technical grounds. The reason for this is—heating the water expands it just the same as it does any metal, and unless the speed of flow is increased, which is not advisable, the same amount of water flowing in the same length of time would need a slightly larger opening at 200 deg. Fahr. than at 70 deg. Fahr. As a matter of fact, radiators to-day are made with equal sized inlet and outlet openings, as a matter of reducing the number of different parts used, and thus, the cost, the same casting being used (where possible) for both inlet and outlet. This opening is, however, proportioned to the water flow at the highest possible temperature and consequently highest possible volume, being at the same time proportioned to the lowest useful speed. It is then too large at lower temperatures and speeds. This is, however, a very good fault, and one from which the radiator is not suffering as evidenced by the steaming and boiling which the writer mentions.

By all means put on a new connection, and make it larger, much larger than the old one, even going to the extreme of making it larger than the inlet. If this does not stop the steaming and general overheating of the cooling system, the radiator capacity is too small for the size and power of the engine. If you do all in your power to get the water into the radiator and out again, that is all that can be done with the given size of radiator. If more capacity is necessary, as shown by continued steaming and overheating, after this is done, the only thing left is to get a new and bigger radiator.

There is this to be said about getting a new radiator: the radiator builders have reached such a high degree of skill in building coolers, that the same sized radiator as they are now built will doubtless suffice to cool your engine. It is, of course, possible that there is something wrong with the water jackets or other internal parts of the engine, which cause it to overheat more than other engines, but by following out the advice given in regular order, you will soon arrive at the proper conclusion.



Sketch of Radiator Layout Which Gave Trouble

LETTERS INTERESTING

IDENTITY OF VARIOUS CARS

Editor THE AUTOMOBILE:

[2,169]—Will you please answer the following questions through "Letters Interesting, Answered and Discussed?" 1. Is the Keystone car made at Yonkers, N. Y., of foreign construction? 2. Is the Simplex car driven by Robertson in the Fairmount Park race an American or a foreign car? 3. What car is acknowledged to be the fastest stock car in the world? 4. What became of the Haynes car that ran in the 1906 Vanderbilt Cup race.

Denison, Kan. LISLE H. SCNEDER.

Many questions are very hard to answer with a direct yes or no, and the above, or some of them, come in this class. Thus, question 3 cannot be answered in this way. No one car has ever so overshadowed all others as to receive by universal consent the title of champion stock car. In fact, it is just this little difference of opinion as to which is the best that continues to furnish material and men for the constantly recurring stock car races. As to question 4, the best way to find this out will be to write to the Haynes Automobile Company, Kokomo, Ind., couching your question in easily understood language, that is, making it clear just what you want to find out.

The other answers are: 1, the Keystone car made at Yonkers is made from American materials, by American mechanics. This company was formerly located at Dubois, Pa., when the car was called the Keystone Six-Sixty. It was fully described in THE AUTOMOBILE for July 15, 1909, page 109. Question 2. The Simplex car which Robertson drove in the Fairmount is made in New York City, and of a very high grade of material. This car uses much of imported steel, and other material, but does not build a special racing car, its racing machines being but stripped stock cars.

CHECKING UP TIMING FROM MARKS

Editor THE AUTOMOBILE:

[2,170]—Please tell me through "Letters" how to check up the timing of my engine. The timing is marked on the flywheel, but I am only a beginner and do not understand it. How much clearance should be allowed between the slider and valve stem?

Hammondsport, N. Y. S. M. B.

The flywheel will be marked with four or five marks, which are labeled as follows: Inlet opens, inlet closes, exhaust opens, exhaust closes, and possibly an additional line, marked firing point, although the latter is doubtful, as the firing point varies so widely.

The marks mean just what they say. When the flywheel is turned so that the line marked "inlet opens" comes up to the pointer, then the inlet valve in the cylinder should just begin to open at that point, being partly opened farther on and entirely closed at a previous point. Similarly with the exhaust. Turn the flywheel over slowly until the line "exhaust opens" comes up to the pointer, then just at that point, no sooner and no later, the exvalve must begin to open. In case yours is a multi-cylinder engine, there will be four times as many marks as indicated above, these being marked with the number of the cylinder to which they apply. Cylinders are always marked from the front end back, the front cylinder being called one, the next two, the next three, and the rear cylinder (on a four) four. Then, when the mark says Number 1 inlet opens, you will know just which cylinder to look to, to see if the marking is correct. The clearance varies by small amounts, but it would be safe to assume it as between 1-32 in. and 1-16 in., but nearer the former.

ANSWERED AND DISCUSSED

FLYWHEEL WEIGHT AND VIBRATIONS

[2,171]—I have a four-cylinder, four-cycle marine engine of 7-inch bore and 6-inch stroke. Valves are 3½ inches in diameter and the flywheel size 17 inches. The flywheel weighs 125 pounds. This engine is in a speed boat, in which it runs up to 1,000 revolutions per minute. When running at 200 to 500 revolutions there is practically no vibration and the engine runs finely. At 600 to 700 revolutions the vibration is very bad, but at 900 to 1,000 revolutions it disappears again. I have tried all kinds of mixtures with three different carbureters. The pistons of this engine weigh 20 pounds apiece and have four rings, all placed at the top. About how much power would I gain if I took off two of the top rings and bored the piston out on the inside so as to make it lighter by three pounds per piston? What is the need of four rings on a piston, anyhow, as I read of some racing cars with but one piston ring?

Haverhill, Mass. J. G. HUDSON.

Balance, which is reflected in steady running and the absence of vibration, is brought about by a flywheel which is in correct static and running balance, as well as moving parts (crankshaft, connecting rods, pistons and piston pins). If these are out of balance the engine will run streaked as you say yours does. A good scheme would be to use a larger, heavier flywheel, as increased flywheel weight and diameter, which usually spells weight, increase the steadiness of running of any engine. In fact, with a large enough flywheel, the small vibrations due to a lack of balance of the reciprocating parts are completely offset.

Reducing the weight of the pistons will help, although it may alter the compression and seriously. The function of piston rings is to make a sliding connection which is gas tight against high pressures. If the makers judged four rings to be about right for this purpose, reducing the number to two would double the chances of the compression pressure escaping. As to racing machines using but one ring, the writer has heard of but one, and that machine used what was one ring in name only, being actually double arrangement so that the result was that usually obtained by two or more rings, this unique construction being resorted to in order to save weight down to the very last ounce. The change in the pistons, that is, boring them out, will be a very good one, but every one must weigh exactly the same.

LEMOINE TYPE AXLE DESCRIBED

[2,172]—I have frequently heard of and read of the Lemoine axles, but have never seen or heard anything to give me a clue as to just what was meant. Will you tell me through the columns of "Letters" the name of this firm, where it is located, what the firm makes, and also what the special type of axle is, which has been given the firm's name?

Far Rockaway, N. Y. G. A. ERNEST.

A section through an axle known as the Lemoine is shown. This firm is a famous French one, which has turned from fine work in machinery to automobile products, and now makes and sells springs, axles, transmissions, steering gears, and many other parts, all of the highest quality. The full name and address is just plain Lemoine, 21 Rue de Lappe, Paris.

The front axle to which this name has been given is so made that the axle bed or central part is placed on the axle spindle so as to rest upon it, with thrust washers interposed. Other front axles are placed either yoked around the spindle so as to touch it both above and below, or the reverse of this, with the spindle end yoked around the axle end, so as to touch it both above and below. Actually, the difference is one of shape.

ONE CYLINDER FIRES PREMATURELY

Editor THE AUTOMOBILE:

[2,173]—As I have not seen anything in "Letters" which gives any information on my particular trouble, I ask you to answer this. I have a four-cylinder Autocar, with everything in good condition excepting only number three cylinder, which fires prematurely. It always does this after getting warmed up, say, after running a mile. When stopping and cutting off the current the engine will continue to run, and the water will stay boiling hot for several minutes. I took off this cylinder and found a spot, a depression, or rather concave part of the piston about 2 inch by 1-2 inch beginning about 1 inch above the lower ring and running toward the bottom or third ring. It was black and rough, caused by burnt lubricating oil. The cylinder walls show nothing but a perfectly smooth wall, with bright regular surface and ample evidence of plenty of oil, also the other cylinders are in prime condition. Remember the four rings of number three piston are all right, showing that every portion of the rings has worked up against the walls. Kindly let me know what is the matter and how to remedy it, as I am at a loss what to do.

Darlington, Md. H. KENTON WHITEFORD.

Since missing is usually if not always due to some flaw in the ignition system, and nothing is said about this important part of the power plant, it is rather hard to give a definite and useful answer to the above case of trouble.

Generally speaking, missing may be caused by a weak spark, which is caused by a wet or damp coil. To remedy this dry out the coil before a slow fire. Missing is also caused by batteries being exhausted. Remedy, test batteries with a voltmeter, and finding this to be correct, substitute new batteries. This kind of trouble usually manifests itself by the engine misfiring after running some time. The cause of it is, the weak cells gather some strength when standing, so fire the engine all right at starting, but after running a short distance, say a mile, the weakened condition of the cells shows itself in the continued missing.

It may be that the spot you mention has something to do with the trouble, but it is hard to see the connection, as it is not exposed either to the fresh gases, to the spark, or to the burned gases at any time in the stroke.

CYLINDER TEMPERATURES AND RECORD

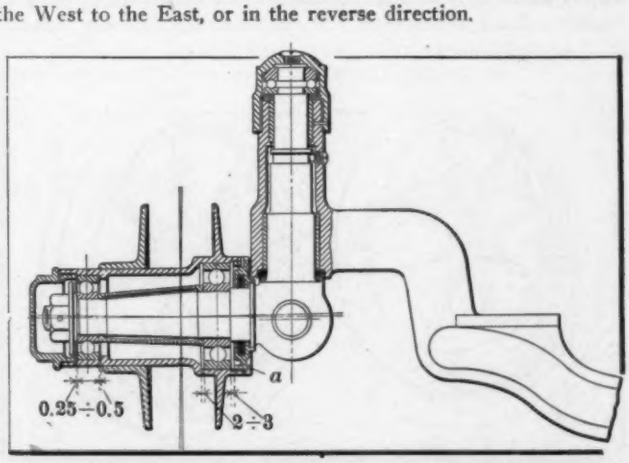
Editor THE AUTOMOBILE:

[2,174]—Please advise me through "Letters Interesting, Answered and Discussed," at what temperature of the cylinder walls, the gasoline engine will be most efficient. I read part of a discussion about this in "The Automobile" at one time, but understand that the figures have been revised since then. Also, will you tell me what make of car holds the time record from coast to coast, or from New York to San Francisco?

Silver Springs, N. Y. HORACE B. BLACKMAN.

The exact temperature to which you refer is just as much in doubt as it was some years ago. Supporters of one kind of engine say at 200 deg. Fahr., while those who favor another type of engine are equally steadfast for a temperature of 350 deg.

Franklin holds the coast to coast record, made however, from the West to the East, or in the reverse direction.



Section Through Lemoine Type of Front Axle.

MERITORIOUS IDEAS FROM ABROAD

Starting a Long-Unused Motor—M. Feron, in *Omnia*, offers a good suggestion as to the best method of starting a motor that has long been unused. He advises the injection of lubricating oil, or of a mixture half oil and half kerosene. Says M. Feron:

"The root of the trouble is in the fact that during the long period of idleness all the oil has run down from the cylinder walls into the crankcase. The pistons are consequently dry, and the metal surfaces are in direct contact with each other, so that they will not hold any gas pressure.

"If a small quantity of thinned lubricating oil is injected, it will flow between and around the piston rings and form a good gas seal; it will disperse the old, dried oil or liquefy it and so render it useful; the motor will answer sweetly to the starting crank, a good suction will be exerted on the carbureter, and the motor will start merrily."

Gnome Inlet Valve—Although the seven-cylinder rotating Gnome motor, which has met with such success in aeronautic work, has been very generally illustrated and described, there is one feature of it which has not received much attention. This is the inlet valve, which is placed in the center of the piston head.

In operation, this inlet valve is automatic. The gas enters the crankcase through the hollow stationary crankshaft. Each valve is balanced against the centrifugal force set up by the rotation of the motor by two small counterweights. The valve spring is a single flat blade, set between these counterweights in such a manner that it is bent whenever the valve opens. Especially neat designing is revealed by the method of setting the valve seat into the piston head, in connection with the bosses for the piston pin.

The piston rings are also unusual. There are in reality two of these, though they look like one. The inner one is of cast iron and the outer, shaped like the letter "L" in cross-section, is of sheet brass. The shape of the ring is such that pressure of gas above it only forces it into closer contact with the cylinder wall.

Cast-Steel Omnibus Wheels—Of a startlingly light appearance, considering the use to which they are to be put, but nevertheless abundantly strong, are the wheels provided by the Atlas Resilient Road Wheels, Ltd., for the London General Omnibus Company. On account of the London police regulations governing the weight of omnibuses, one of the chief considerations in designing these wheels was to make them as light as possible.

The material used is cast steel, and felloe, spokes and hub are all cast in one piece. There are but eight spokes, of an X-shaped cross-section, to each wheel. The average thickness of the steel is about a quarter of an inch. The rims, which are a part of the wheel casting, are adapted to take single solid tires in front and double solid tires in rear. The weight of a front wheel without tire is 88 pounds, and of a rear wheel 203 pounds. The maximum weight allowed to the omnibuses on which these wheels are used is three and one-half "long" tons.

Wimperis Accelerometer—In *Automotor Journal*, January 22, is described and illustrated an instrument recently placed on the English market which indicates the rate at which the car to which it is applied accelerates or slows down. In appearance the device resembles a speedometer, but does not need to be connected to the wheels.

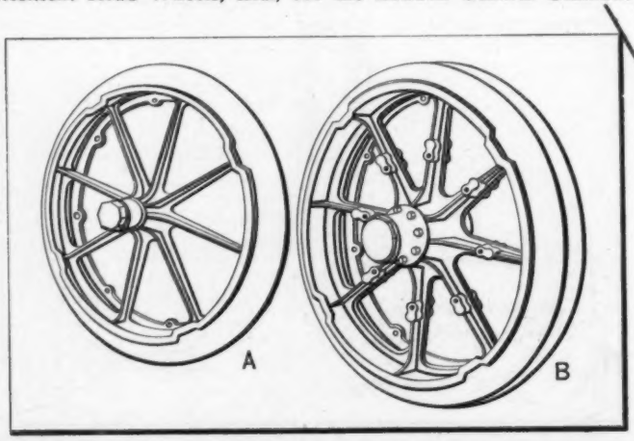
When the car is started the needle swings backward over a part of the scale marked "acceleration," and the figure to which it points gives the rate of acceleration in feet per second per second. Suppose, for example, the needle points to the figure "5"; at that instant the car is then increasing its speed at the rate of 5 feet per second during each successive second of time. If the speed at that moment happened to be 10 feet per second, at the end of a second it would have increased to 15 feet per second.

On the other side of the central zero the scale shows the retardation, as produced by the effect of the brakes, or when the car is coasting to a stop. Secondary scales beneath show upward and downward gradients in fractional form; the readings on these are correct only when the car is at a standstill or moving at constant speed. The instrument singles out and indicates only the acceleration produced by the motive power of the car; if the motor is powerful enough to give an acceleration of 2.2 feet per second per second on level ground, the instrument will still read 2.2 whether the start is made up hill or down hill. The same applies to the deceleration due to brake action.

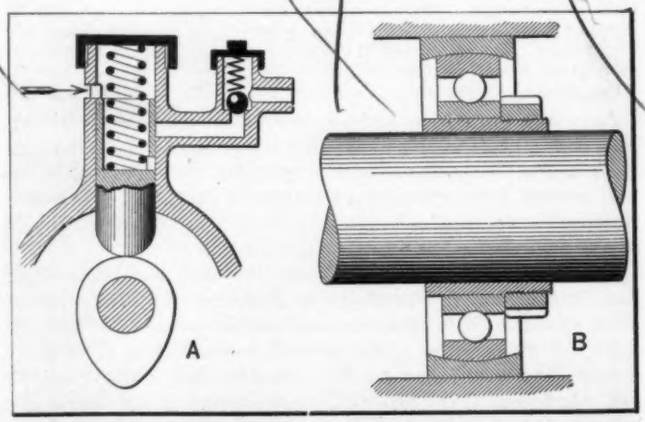
The principle of operation is that of inertia; inside the instrument there is a horizontal copper disc with an eccentric center of gravity, controlled by a light spring similar to the hairspring of a watch, and damped magnetically.

Wolseley-Siddeley Air Pump—This account of the pump fitted to maintain air pressure on the gasoline tank of the 20-28-horsepower Wolseley-Siddeley car is one of the novelties culled from the January 22 issue of the *Automotor Journal*.

A hollow plunger, with a key to prevent twisting and a spring to give return motion, is operated by a cam on the camshaft. On the upward movement of the plunger, the air contained in the upper enclosed chamber is compressed until the highest position of the plunger is reached; a small delivery port in the plunger then registers with a port in the cylinder, and the pressure is released into the pipe communicating with the tank. A ball check



Cast steel wheels used by the London General Omnibus Company, now regular equipment on vehicles plying in the English metropolis. A front, B rear wheel.



A shows diagrammatically the air pump used to maintain gasoline pressure on the Wolseley-Siddeley cars; B is the Stichel spherical-seated ball bearing.

valve assists in retaining the air thus entrapped. Owing to the proportion of clearance above the plunger, the air cannot be delivered at a pressure of more than 4 pounds to the square inch.

The spring returns the plunger, setting up a slight vacuum. As soon as the intake port is uncovered, the chamber is again filled at atmospheric pressure, and the compression is repeated. All the objections to the exhaust-pressure arrangement seem to be overcome by this pump. There can be no water introduced into the gasoline, no failure of pressure when the engine is running light, no sticking of the valve from gummed lubricating oil deposits. Of course, no safety valve is required.

Bingham Piston-Valve System—This ingenious valve motion, which was applied to a Bentall chassis on exhibition at the Olympia show in London, is described in the January 22 issue of the *Automotor Journal*.

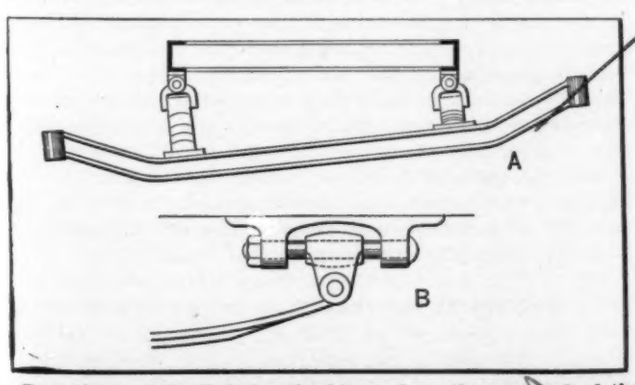
The overhead shaft is revolved at one-quarter the speed of the crankshaft, as the rectangular ports in the valve piston register with the cylinder port on both the up and down stroke of the valve. The very slow "valve speed" thus obtainable, together with the comparatively small diameter of the valves themselves, are points which should both tend toward long life. It should be noticed that during the power stroke the valves are not in lateral balance, the valve surface subjected to the explosion pressure being an area equal to that of the cylinder port; as, however, the valves are very long, the thrust from the explosion is distributed over a considerable surface.

One objection to the system is the five pin joints necessary to drive each valve. The two at the ends of the valve connecting rod are lightly loaded and have but a slight angular motion; the other three have little more movement, but approximately three times the load. There are several points of excellence—slow "valve speed," silent driving gear, probable immunity from leakage owing to small valve diameter, and considerable port area.

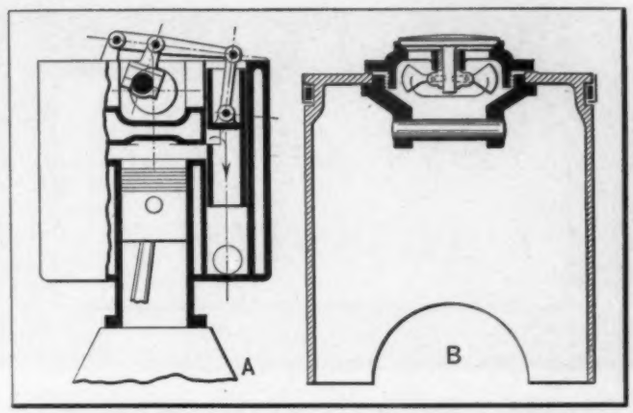
Daimler Spring Shackle—In the January 22 issue of the *Automotor Journal*, in a contest describing novelties seen at the Olympia show, one of the prizes is given to a description of the front spring shackle of the new Daimler cars.

When one front wheel of a car has to mount a considerable obstacle, in order to allow for the deflection of the spring on that side, the springs on both sides must necessarily twist. The ordinary spring shackles allow only for an equal spring deflection on both sides. For the twisting strain so often sustained the ordinary laminated spring is entirely unsuited, and this strain is the cause of much of the wear on the shackles and their pins.

The Daimler spring shackles at the rear ends of the front springs are designed so that they can swing laterally from pins arranged lengthwise of the car, which at the same time give the backward and forward play necessitated by the compression of the spring. As shown by the drawing, when one end of the axle is considerably raised, both shackles swing until their pins are approximately parallel to the axle. A slight spring torsion must still take place, however, as the unshackled front end of the spring will not allow any sidewise swinging. At the same time there is no additional complication.



Two views of the Daimler shackle used on the rear end of the front spring. A shows the displacement of the axle, and B the shackle itself.



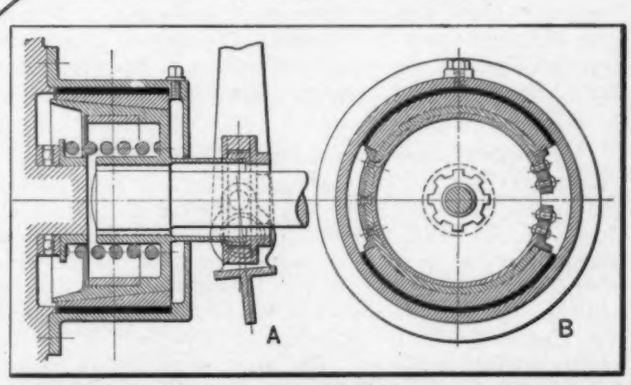
A—The Bingham piston valve system used on the Bentall cars; B—Inlet valve located in cylinder head, on the seven-cylinder Gnome aeronautic motor.

Stichel Ball Bearing—German patent No. 216,502, granted to Otto Stichel, of Leipzig, covers a ball bearing mounted in a spherical seat. The construction of the bearing permits a lengthwise movement of the shaft, such as may naturally occur through changes in temperature, and also a change in direction of the axis, a condition especially to be provided for in automobiles. Thus is prevented any pinching of the balls, which is likely to result in breakage. The outer ball race is spherical on its outer surface, and has a special ring with a spherical inner surface to receive it. The outer surface of this ring is cylindrical, and is mounted in the usual manner, with a slight allowance for endwise motion.

Expanding Band Clutch—The clutch illustrated herewith is used by several makes of French commercial cars, and has been found very satisfactory. It consists of a cast-iron cylinder, bolted to the flywheel, inside of which a brake band is caused to expand by a sliding cone.

There are two brake shoes, faced with a suitable friction material, with their inner faces of a conical shape. They are supported by a conical-faced drum keyed to the clutch shaft, and are held from revolving with respect to the drum by angle pieces riveted to the face of the latter. Inside of the drum is a spring-steel band, the ends of which project through a split in the drum and bear against the sides of the brake shoes. Thus each shoe is supported on one side by a stop on the face of the drum, and on the other by an end of the steel band. The conical drum is pressed out by a coil spring, in its turn thrusting the brake shoes apart and into engagement with the inner surface of the cylindrical drum bolted to the flywheel. To release, the cone is pushed in, and the spring band draws the brake shoes together and out of engagement.

Much smoothness of engagement, besides a quick and positive disengagement, are claimed for this form of clutch. In addition it is simple, not likely to get out of order, cheaply built and has little inertia to cause spinning in gear-changing.



Expanding band clutch used successfully on several French commercial cars; A shows the longitudinal, and B the lateral section of the clutch.

RECENT CLUB ACTIVITIES

BUCKEYE CAPITAL'S CLUB TO BE REORGANIZED

COLUMBUS, O., Feb. 14—A complete reorganization of the Columbus Automobile Club will be made at a special meeting to be held in a few weeks. This was decided on recently when a committee was named to draft a new constitution and by-laws which will be presented to the membership. The plan is modeled after that in vogue in Cincinnati and Cleveland, which has proved a success.

The feature of the plan is a board of governors, which will meet weekly with the salaried secretary. All matters of moment will come before the board of governors and this will take the work and responsibility off the officers, as has been the case in the past. A campaign for membership is being started and it is expected to double the number of members.

A. C. A. ACTIVITY OF A TECHNICAL CHARACTER

A. L. McMurtry, chairman of the technical committee of the A. C. A., is kept very busy these days making tests and investigations of a character which should prove of the greatest possible interest to the automobile industry at large as well as to the members of the club. The facilities afforded for original research at the club are such that the results should be reliable, and, in the hands of McMurtry, exactness is to be expected. The club dynamometer is receiving a quota of attention, and it may be that something will be made of it in the long run. It is now proposed to eliminate errors by driving from the dynamometer motor through a device which will be fastened to the wheel of the automobile. This will, to some extent, lessen the present slight errors due to tire slippages.

IOWA CITY GETS AUTO CLUB

Articles of incorporation of the Iowa City, Iowa, Automobile Club have been filed with the county recorder. This club is not born for pecuniary purposes, and has no capital stock. The object of the organization is to battle for good roads and to secure if possible other much needed reforms.

The incorporators and directors are: F. C. Carson, F. X. Freyder, O. H. Carpenter, James W. Dvorsky, Ed. B. Wilson, John McCollister and Will Carson. The charter officers are: President, Frank C. Carson; Vice-President, F. Freyder; Secretary, O. H. Carpenter; Treasurer, James W. Dvorsky.

OHIO'S GROWING ROLL OF COUNTRY CLUBS

CANTON, O., Feb 14—At a meeting of autoists of Stark County, held at this city recently, the organization of the Automobile Club of Star County was effected. The club starts with a membership of 126. A fee of $5 is charged, which entitles the members to membership in the A. A. A. The club will hold monthly meetings. Officers were elected as follows: J. H. Kenny, president; Charles Steese, Jr., Massillon, vice-president; W. A. Hoberdier, secretary-treasurer. The board of governors consists of Edward E. Bender, J. R. Dangler, John Sherer, W. L. Stolzbacher and J. G. Best.

ANNUAL ELECTION OF CENTURY MOTOR CLUB

The Century Motor Club of Philadelphia, at its annual meeting, elected the following officers: J. Fred Hartman, president; Frank R. Isaac, vice-president; C. D. Holden, secretary; F. R. Davis, treasurer, and the following board of directors: Edwin M. Abbott, J. Howard Clarke, Edward H. Ervin, H. G. Evans, Henry Goldthrop, Ralph Humphreys, Lucien V. Leach, Dr. C. F. Rau, Dr. Clayton S. Schwenk, C. B. Sears and R. N. Storey. Edwin M. Abbott was elected counsel for the club.

ANOTHER COUNTY IN WISCONSIN HEARD FROM

The Rusk County Automobile Club has been organized with headquarters at Ladysmith, Wis., and will doubtless affiliate with the Wisconsin State Automobile Association. E. M. Worden, of Ladysmith, was elected president and the other officers are: T. M. Thomas, secretary; H. W. True, treasurer.

SHOW BREVITIES

INDIVIDUAL SHOWS IN INDIANAPOLIS

INDIANAPOLIS, Feb. 14—The annual automobile show in this city will be held during the week of March 28, and as usual will be under the auspices of the Indianapolis Automobile Trade Association, which now has forty-nine members, embracing dealers and manufacturers, both of cars and accessories. This year's show will be of more importance than usual, owing to the general enthusiasm that is being shown in the plans.

Each dealer and manufacturer will exhibit in his own establishment. This will be necessary from the fact that the only building that would be available for a show all under one roof, is located at the State Fair grounds, about four miles from the city and regarded as too inaccessible to the public. To make up for the fact that the show will not be under one roof, the association arranged an elaborate program of outdoor events.

The first of these will be a magnificent floral parade on Wednesday afternoon. On Thursday afternoon there will be a program of speed trials and novelty events at the Indianapolis motor speedway, taking the place of similar events that have been held on the North Capital avenue boulevard during show week in previous years. Another parade will be given Friday, exclusively for commercial cars, of which there are about 150 in the city.

Officers of the I. A. T. A. are: President, Fred I. Willis, of the Hearsey-Willis Company; secretary, Frank B. Willis, of the Willis-Holcomb Company, and treasurer, Frank L. Moore, of the Fisher Automobile Company.

DENVER ENTHUSIASTIC OVER SHOW PROSPECTS

DENVER, Feb. 11—The preparations for the second annual automobile show, to be held in the Auditorium, February 23 to 26, are almost complete, and are most encouraging to the members of the promoting body, the Denver Motor Club. The show will undoubtedly rank high among those held west of Chicago. The club has had an artist busy for several days on the color schemes and decorative effects, so that the decorators have a plan to work on. All exhibits will be decorated uniformly.

With the exception of a few small boxes the floor space has already been disposed of. The list includes dealers handling 37 makes of automobiles, besides a number of motorcycles and a goodly array of accessories.

PROSPERITY SHOVES OMAHA SHOW TO FRONT

Everything points to the show this year being a tremendous success. Not only is the entire main floor filled up, but the management has been compelled to open up the basement, and the space there has also been contracted for.

FEW CHANGES DESIRED IN BAY STATE LAWS

BOSTON, Feb. 14—Little inclination on the part of automobilists or "antis" to tinker with the Massachusetts automobile law has yet appeared in the Legislature. Apparently all hands prefer to wait until the law, which became fully effective the first of the year has been given a test before suggesting amendments or changes. But whatever the cause may be there have been fewer bills filed at the State House relating to the operation of automobiles than in any session of the Legislature for a long time. There are some important measures proposed concerning highways and therefore indirectly affecting the motorists, but of strictly automobile bills there are only three or four.

Two of these are the so-called "light" bills, a piece of legislation that has been proposed in recent years as often as the Legislature has met, and has been as regularly rejected on account largely of the rural influence, which objects strongly to protecting itself by carrying a light on horse-drawn vehicles at night. Both the bills propose that all horse-drawn vehicles using the highways from a half-hour after sunset until a half-hour before sunrise shall carry a light or lights, the size and location of which are left to the determination of the Highway Commission. These bills have been referred as usual to the committee on roads and bridges.

The bedlam created especially in the cities, by that part of the new law requiring the sounding of a warning signal by an automobile operator when approaching a corner, curve, intersecting way or a pedestrian not on the sidewalk has got on the nerves of some people, and a bill has been filed designed to diminish it. This bill would limit warning devices to the ordinary horns and bells and prohibit the harsh-toned instruments of torture that have become common of late and which, being easily sounded, are set off in complete compliance with the law. It may be also that some effort will be made to modify the law so that incessant sounding of horns will be unnecessary.

The Highway Commission this year makes no recommendations whatever for changes in the automobile law. It makes some important suggestions, however, in regard to highways. One of these is that in the process of elimination of grade crossings with railroads which is going on all over the State, more attention should be given the rights of automobilists and other users of the highways. It recommends that in cases where the railroad is carried over the highway there shall be a clear view ahead of at least 150 to 200 feet and that on curves there shall be a clear view of the roadway for at least 150 feet. In some cases where crossings have been abolished the conditions for users of the highway have been made more dangerous than before, and the board cites instances where underpasses are paproached at sharp angles or where the bridge is too narrow, in some cases vehicles being obliged to approach a blind turn and swing onto electric car tracks in order to go under the railroad. Another important suggestion of the Highway Commission is for a broader administration of the highways by their division into main, secondary and local routes. Such a system would lend itself to better and more economical administration.

ROAD BUILDING NEWS

GOOD ROADS PLENTIFUL IN THE BLUE GRASS COUNTRY

LOUISVILLE, KY., Feb. 14—In the mountain sections of Kentucky, Tennessee and Virginia, where formerly the roads were practically nothing more than creek beds, available in dry weather and impassable in the rainy season, it is interesting to note the development with reference to improved highways. Appreciation of good roads by the people of the Cumberland Mountains has been due in a large measure to the construction of the military road through Cumberland Gap. This road was built by United States Government engineers as an object lesson, for the purpose of showing that road building is possible in any section. It has been in use for more than a year and is as smooth as asphalt.

The road was constructed along the line of the old Wilderness road, through which pioneers first entered eastern and interior Kentucky. It is the great traveled highway from Virginia to Kentucky and Tennessee. Since its completion, the Cumberland Gap Military road has been used continuously for automobiles, log wagons and all sorts of vehicles.

Automobilists passing through this part of the country will be most richly repaid. In its sublimity the scenery cannot be equalled anywhere and the environments are full of historic interest. If the shade of Daniel Boone could see the excellent highway that has supplanted his old trail he, too, would be convinced that good road ideas have spread marvelously since his day.

Since the advent of the automobile, road development throughout the entire South has been more pronounced than any previous period. Miles and miles of roadway, as level as a well-kept boulevard, can be found in the Blue Grass section of Kentucky. This part of the State is famous for its good roads, which are among the finest in the country.

In Kentucky there has been considerable speculation in respect to the relative severity of the automobile and the horse-drawn vehicle on macadam highways. Numerous tests have been made practically all of which have developed the fact that an automobile is less destructive than horse-drawn vehicles.

The Louisville Automobile Dealers' Association deserves the good will of every automobilist who has used the roads in the vicinity of Louisville. It has been instrumental in the posting of the roads throughout this section of the State. The work has been in progress many months, and the various signs indicate all bad places, the speed limits as well as the distance to the various points about the city. As a result of the efforts of the Louisville Automobile Club and the Louisville Dealers' Association the roads in the vicinity of Louisville are in an excellent state of repair. This is a condition much to be desired, and one that other parts of the country might well try to match.

LAW AND THE AUTOMOBILE

VERY STIFF SENTENCE FOR CAR STEALER

BUFFALO, Feb. 14.—Nine years and eight months imprisonment at hard labor was the sentence passed upon an inveterate motor car thief by Justice Truman G. White in Part III of the Supreme Court to-day. The prisoner earning this the stiffest sentence that has been dealt out for grand larceny in Buffalo in a long time was Ed. Houck. But for the fact that the law prohibits a sentence under which prisoners are liable to leave prison in the cold months, Justice White would have given Houck the limit, 10 years.

Houck was convicted of stealing an automobile the first time in 1906. He was given a suspended sentence for this. The next year he stole another machine, and was sentenced to a year in the Elmira Reformatory. When he emerged in 1908 on parole, he stole another machine, and was given another year for violating his parole. He had not been out a month after serving time for the theft of the third automobile before he stole his fourth.

HERRESHOFF

HERRESHOFF, in the car for 1910, is offering a car which especially appeals to purchasers who put quality ahead of price, and, in view of the mechanical perfections of the power plant, it is made the feature of this article. This plant is of the unit type, with the magneto on the left and the carbureter on the right side.

SELF-CONTAINED POWER PLANT REPRESENTS A UNIT

The motor is of a four-cycle, four-cylinder, water-cooled type, with cylinders cast in pairs, with integral water jackets. The cylinder bore is 3 3-8 inches, and the stroke is 3 3-4 inches. The inlet and exhaust valves are of large diameter, interchangeable, and are located on one side. This construction operates to reduce the loss of heat in the water jackets and to conserve the power, since the incoming gas helps to cool the exhaust chamber.

The valves are operated by very hard steel cams, on one camshaft, which is mounted on imported ball bearings. The inlet and exhaust manifolds are large and have no elbows or corners for the collection of gas. The former is designed to allow the passage of gas to the cylinders with the least amount of friction and the latter to relieve the cylinders of the burnt gases with the least possible back pressure—thus preventing overheating and a consequent loss of power.

The crankshaft runs on three imported ball bearings; it is a drop forging of the best grade of steel for the service it performs, and ground to exact size. In order that it will run without vibration, the shaft is "balanced" as a unit and with flywheel assembled.

The connecting rods are of drop-forged steel of I-section, designed to withstand the heavy compressive stress they necessarily have to carry. The connecting rod caps are doweled and held in place with chrome nickel-steel bolts. The bearings on the crankshaft are of ample proportions and made of special grade of die-cast babbit. The upper ends of the connecting rods are securely clamped to hollow wrist-pins of special design, which have their bearings in the pistons. The latter are made of the very best grade of gray iron, and well ribbed to withstand the high pressure of the explosion. There are four eccentric piston rings, made of special cast iron and ground to size.

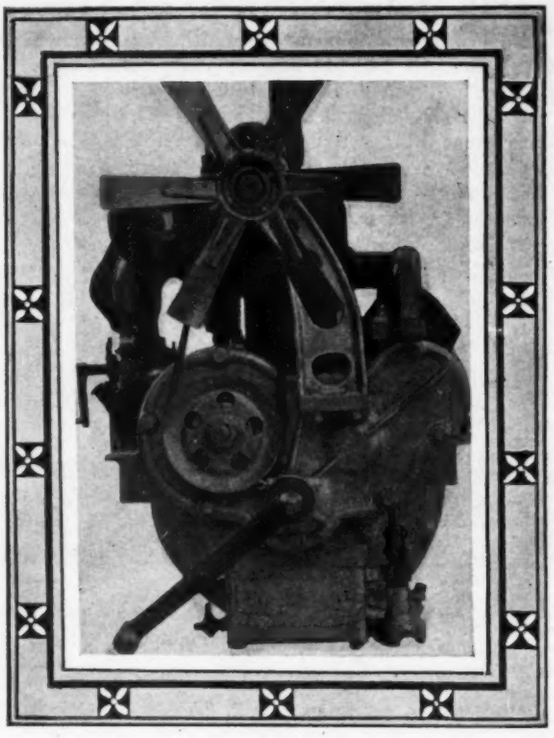


Fig. 1—Front end view of the motor, depicting the encased half-time gear system, air propeller and starting crank.

The carbureter is of the float-feed automatic type, the gasoline feed being regulated by a graduated needle valve. The gas is controlled by a hand lever on the steering wheel and by a foot acclerator. The gasoline tank is placed under the driver's seat, the gasoline being fed by gravity to the carbureter. On the runabout and tourabout types, an air pump is provided for pressure feed for use on hills.

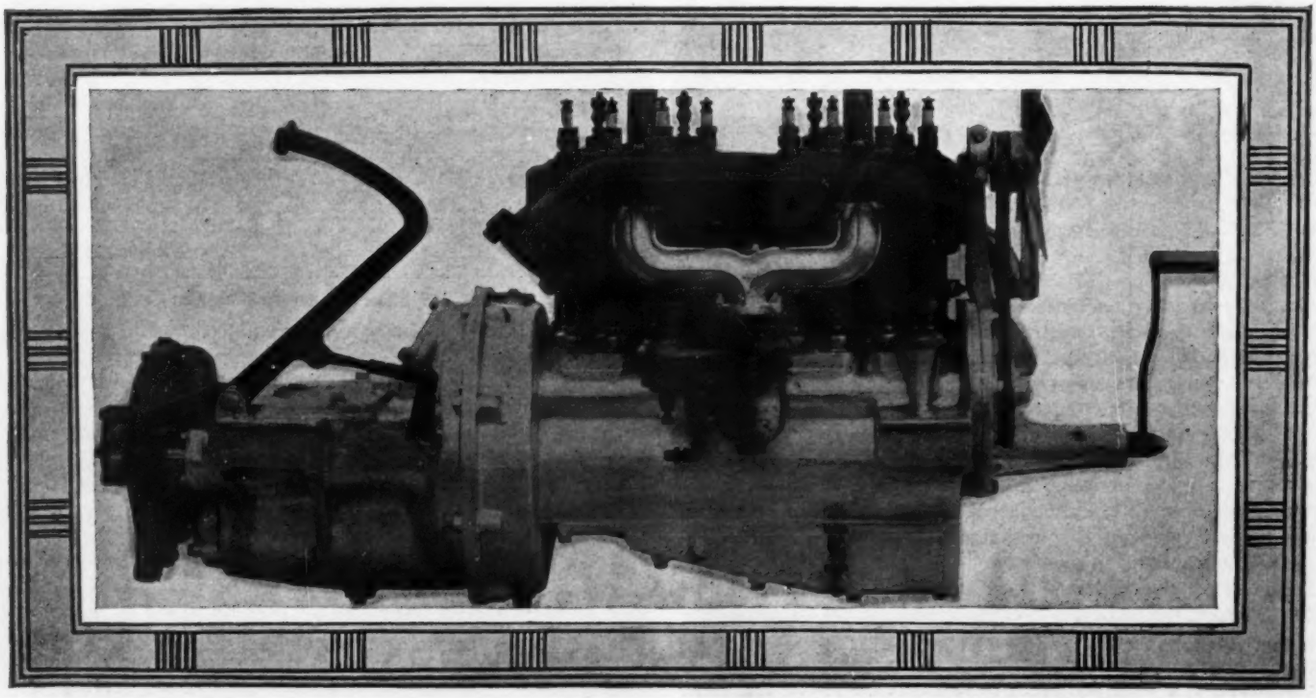


Fig. 2—Right side of the unit power plant, showing location of carbureter, contour of piping and compactness

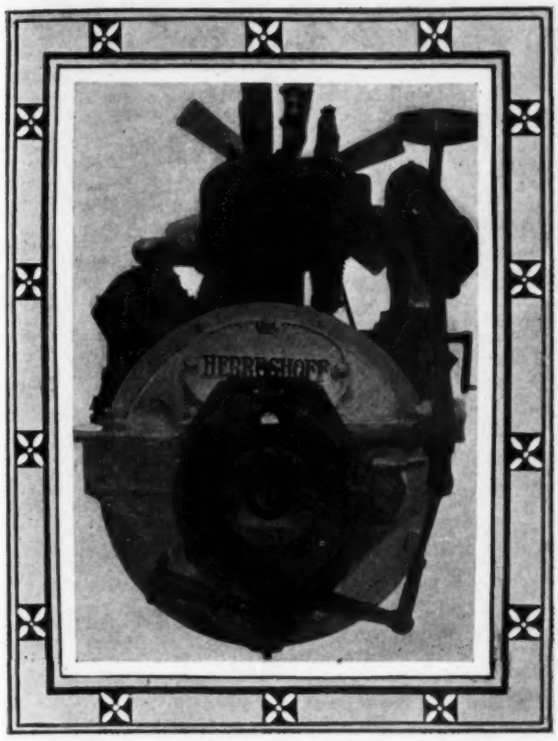


Fig. 3—Rear end view of the motor looking into the flywheel, showing details of the connections for the clutch

COOLING SYSTEM INCLUDES A VERTICAL TUBE RADIATOR

The vertical type radiator is of large capacity and of such shape and proportion as to give the car an imposing front. The drawn brass pipes, which carries the water to and from the cylinders are carefully proportioned, and of large capacity—thus facilitating the thermo circulation. The fan behind the radiator is mounted on ball bearings, and driven by a V-shaped belt from a pulley keyed to an extension of the camshaft.

Two of the best independent systems of ignition are provided—high-tension Bosch magneto, operated with a fixed spark; and a storage battery, four-unit coil and timer. These two systems are controlled by a switch in easy reach on the coil box, located on the dash.

The magneto is located on the left-hand side of the crankcase and is held in position by a clamped band. It is driven from the crankshaft gear through an idler gear. A flexible coupling is provided in its driving shaft, which shaft is mounted upon imported ball bearings. All high-tension cables are carried in insulated brackets so that short-circuits are practically impossible. The timer in connection with the storage battery circuit, runs on ball bearings, and is of approved design, and driven from the magneto driving shaft by spiral gears.

POWERPLANT

CONSTANT LUBRICATION BY POSITIVE FEED SYSTEM

The lubrication of the motor is by a constant feed system and operated by a self-contained gear pump. A reserve reservoir is located underneath the crankcase proper, from which the oil is pumped through a copper tube to the sight feed on the dash, from which it is fed by gravity into the two compartments of the crankcase, where a constant level is maintained. The lower tips of the connecting rod bolts dip into this oil and throw it to all parts within the case and pistons. A strainer is provided in the reserve reservoir so that foreign substances are not drawn into the system. The gear pump is driven by the same spiral gear which drives the timer.

Adequate lubrication is one of the most essential features of a successful car, since without it the most perfectly constructed mechanism will not give satisfactory service and will wear out quickly. Our oiling system is positive in its action, and can therefore be depended upon to keep in well-lubricated condition our carefully designed mechanisms. This system has been successfully used for years past on prominent makes of cars.

The Herreshoff Motor Car Company, Detroit, Mich., is the maker of this product and, contrary to the usual agency methods, the cars are handled direct from the plant. There are two models, one of which is a runabout, and the other, as a touring car, seats four.

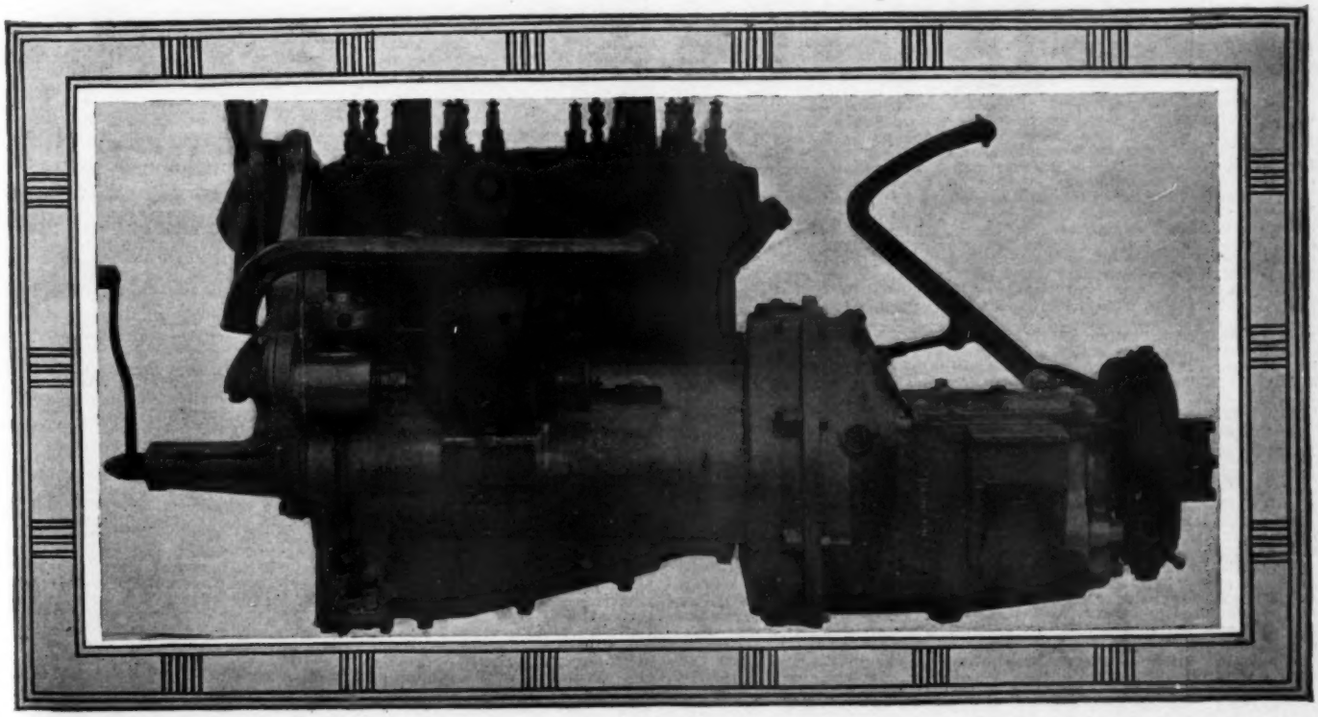


Fig. 4—Left side of the power plant, showing location of magneto, method of fastening and other mechanical features of note

DIFFICULTIES IN THE WAY OF STANDARDIZATION

THAT the automobile will ultimately be standardized is one of the things that is fast becoming too apparent to be disregarded, and this point is never so clearly brought out as when a "public letting" has to be struggled with. When some branch of the Government undertakes to purchase an automobile an elaborate contract is first drawn up, it being the handiwork of the office of the Corporation Counsel or other legal illuminaries with specific reference to a general specification of the automobile which is wanted. The lawyers seem to have very little trouble in drawing up the contract, but the mechanical experts fail utterly to describe a theoretical automobile which will come within many miles of what the bidders would have to offer, there being no definite relation of the several makes of automobiles to a theoretical standard (or standard arrived at by engineering bodies), so that all the legal phraseology which comes from the office of the Corporation Counsel, for illustration, is wasted in view of the absence of any language which will fairly describe an automobile in the abstract, with the understanding that the lowest competent bidder will truly deliver a satisfactory machine and with the further understanding that every maker will be equally and justly treated. A purchasing contract seems to be a most formidable document, and with the idea of showing something of this angle a blank form which emanated from the legal department of a city government is here given. The real question, however, remains unanswered, and it is believed that this question should be discussed at sufficient length to harmonize the details so that in the long run purchasers will be enabled to determine as to the real value of the respective automobiles if purchased under a contract such as this. The columns of the THE AUTOMOBILE are open to pertinent discussion from any competent source.

CONTRACT AND SPECIFICATIONS

FOR FURNISHING AND DELIVERING ONE (1) AUTOMOBILE AND ACCESSORIES

Parties

This agreement entered into this.....day of.....in the year nineteen hundred and....., between ..... of ..... City.....County and State of..... to be known hereinafter as the "Purchaser," and..... .....of.....City.....County and State of.....to be known hereinafter as the Contractor.

Covenant

Witnesseth, the parties of these presents, each in consideration of the agreements on the part and behalf of the other herein contained, have agreed, and hereby agree, the party of the first part for himself and with successors, and the party of the second part for him (or them) self (or selves) and his (or their) executors and administrators, as follows:

(A) That wherever the term "purchaser" is used, or a pronoun instead, such term shall refer to and mean the party first above mentioned, and no other.

(B) That wherever the term "contractor" is used, or a pronoun instead, such term shall refer to and mean the party second above mentioned, and no other.

(C) Wherever the word "engineer" is used in these specifications, or in this contract, it refers to and designates Mr..... ..... supervising engineer of the purchaser, acting either directly or through any assistant or inspector, duly appointed by the purchaser, or designated therefor by the supervising engineer of the purchaser, or through any such assistant, to receive, weigh, inventory, or inspect the automobile, in whole or in part, or the accessories thereunto belonging, or to be furnished, limited by the particular duties intrusted to him, or them.

(D) Wherever it is provided that anything is to be, or to be done, if or as, or when or where "approved," "required," "directed," "specified," "designated," or "deemed necessary," it shall be taken, unless otherwise expressed, to mean and intend, approve, required, directed, specified, designated, or deemed necessary, as the case may be, by the purchaser or the engineer of the purchaser.

(E) The contractor will provide, furnish and deliver to the purchaser, at his own cost and expense, at the time and place, and in the manner and under the conditions hereinafter specified, the automobile and accessories mentioned, and described in the specifications and schedule, and will accept as full compensation therefor the sum set opposite the respective articles or classes of articles in the specifications or schedule herein contained or hereto annexed, the said sum being the amount at which the contract therefor was awarded to the contractor at the letting thereof.

(F) This contract and specifications is the complete and final instrument embodying this entire transaction, superseding all previous written and oral discussions, agreements, or understandings in relation to this subject matter, subject to no changes, additions or subtractions whatsoever, excepting by virtue of a written supplementary contract, duly executed by the parties hereunto.

(G) The contractor will give his personal attention constantly to the faithful prosecution of the work; he will not assign, transfer, convey, sub-let, or otherwise dispose of this contract, or his right, title or interest in or to the same or any part thereof, without the previous consent in writing of the purchaser, endorsed hereon, and he will not assign, by power of attorney or otherwise, any of the moneys to become due, and payable under this contract, unless by such previous written consent, signified in like manner. If the contractor shall, without such previous written consent, assign, transfer, convey, sub-let, or otherwise dispose of this contract, or of his right, title or interest therein, or any of the moneys to become due under this contract, to any other person or other corporation, this contract may, at the option of the said purchaser, be revoked, annulled, and the purchaser shall thereupon be discharged from any and all liability and obligations growing out of the same to the contractor, and to his assignee or transferee, provided that nothing herein contained shall be construed to hinder, prevent or affect an assignment by the contractor for the benefit of his creditors, made pursuant to the statutes of the State of.....; and no right under this contract, or to any money to become due hereunder, shall be asserted against the purchaser, in law or in equity, by reason of any so-called assignment of this contract, or any part thereof, or of any money to grow due hereurder, unless authorized as aforesaid, by the written consent of the said purchaser.

(H) The said automobile and accessories and each and every part thereof shall in all respects conform strictly with the herein contained specifications, and schedules referred to, by the purchaser as a standard of quality, style, finish, or manufacture that will be required.

(I) The purchaser may appoint such engineer, inspector, or assistant as may be deemed proper to inspect the automobile or the accessories furnished and delivered under this contract, and such engineer, inspector, or assistants are authorized and empowered to reject and refuse any part, or the entire equipment, if any part thereof offered under or in fulfillment of this contract does not comply in kind, quality, or quantity, size or number, or weight, or in time or in place of delivery, with the said specifications.

(J) Any part or parts of the said automobile or accessories delivered or offered to be delivered under this agreement, which shall be rejected by the engineer, inspector, or assistant, as not conforming to the aforesaid specifications, shall be forthwith removed, and the part or parts which do so conform shall be furnished and delivered in the place thereof.

(K) The automobile and accessories provided for in this contract and set forth in these specifications must be delivered within ..... (.....) days, exclusive of Sundays and legal holidays, from the date of order.

(L) To prevent all disputes and litigations, the "purchaser" shall in all cases determine the amount or the quantity of the automobile and accessories to be paid for under this contract, and shall determine all questions in relation to said automobile and accessories, their quantity, delivery and condition, and he shall in all cases decide every question which may arise relative to the execution of this contract, on the part of the contractor, and his estimate and decision shall be final and conclusive and shall be a condition precedent to the recovery of any sum or sums of money by the contractor under this contract.

(M) If the contractor shall well and faithfully perform and fulfill this contract and keep every covenant on his part herein contained, the purchaser will then, but not before, pay to the contractor the sum of .....dollars ($.....), but no more.

(N) The contractor shall not be entitled to demand or receive payment for the said automobile and accessories, or any part thereof, or accept in the manner set forth in this agreement, nor until each and every one of the stipulations herein mentioned are complied with, and the engineer shall have given his certificate to that effect, provided that nothing herein be construed to affect the right hereby reserved by the purchaser to reject the whole or any part of the automobile, and accessories, delivered or offered for delivery, should the said certificate be found or known to be inconsistent with the terms of the agreement or otherwise improperly given.

(O) The contractor shall be responsible for any claim made against the purchaser for any infringement of patent right for the sale, supply or use of any patented articles, materials, or apparatus furnished or supplied under this contract, and that he shall save harmless and indemnify the purchaser for all costs, expenses and damages which the purchaser shall be obliged to pay by reason of any infringement of patent resulting from such sale, delivery, or use of said automobile and accessories, or any part thereof.

(P) If the contractor shall fail to furnish and deliver the automobile and accessories as herein agreed to be furnished and delivered, or any of them or any part of them, at the time or in any manner when or wherein they are agreed to be delivered, or if this contract shall be sublet or assigned by the contractor otherwise than as herein specified, the purchaser shall have the power to notify the contractor to discontinue all delivery, or any part thereof under this contract, by a written notice signed on behalf of said purchaser by himself or the engineer to be served upon the contractor either personally or by leaving the same at his residence or with his agent in charge of the work; and thereupon the contractor shall discontinue the delivery of said automobile and accessories or such part thereof as the purchaser may designate, and the purchaser shall thereupon have the power, in the manner described by law, to contract for the completion of the work, by contract or otherwise, as the purchaser may deem advisable, and charge the expense thereof to the contractor, and the expense so charged shall be deducted and paid by the purchaser out of the moneys that may then be due, or thereafter grow due, to the contractor under and by virtue of this agreement, and in case such expense shall exceed the sum which would have been payable under this contract if the same had been completed by the contractor, then the contractor shall pay the amount of such excess to the purchaser or notice from the purchaser of the amount of such excess, and in case such expense shall be less than the sum which would have been payable under this contract, if the same had been completed by the con-

tractor, then the contractor shall receive the difference, after deducting ten (10) dollars per day for each working day, between the contract date of delivery and the date of completion of the work.

(Q) The residence or place of business given in the bid or estimate upon which this contract is founded is hereby designated as the place where all notices, letters and other communications shall be served, mailed or delivered. Any notice, letter or other communication addressed to the contractor and delivered at the above named place, or deposited in a post-paid wrapper in any post office, shall be demed sufficient service notice thereof upon the contractor. The place named may be changed at any time by an instrument in writing, executed and acknowledged by the contractor, and delivered to the purchaser. Nothing herein contained shall be deemed to preclude or render inoperative service of any notice, letter or other communication upon the contractor personally.

(R) The contractor may make delivery of the said automobile and accessories within..... (.....) days, Sundays and legal holidays excepted, and..... ..... (.....) days, Sundays and legal holidays excepted, from the date of execution of this instrument by the parties hereunto.

(S) In case the contractor shall fail to complete the delivery of such automobile and accessories in accord with the specifications, and to the satisfaction of the purchaser, within the time aforesaid, the contractor shall and will pay the purchaser an amount equal to 1 per cent. of the contract price for each and every day the time consumed in said delivery may exceed the time hereinbefore allowed for the purpose, which said amount, in view of the difficulty of ascertaining the loss which the purchaser will suffer by reason of delay in the delivery of the said automobile and accessories, or any part thereof, is hereby agreed upon, fixed and determined by the said parties hereunto as the liquidated damages that the purchaser will suffer by reason of said delay and default, and not as a penalty, and the purchaser shall and may deduct and retain the amount of said liquidated damages out of the moneys which may be due or become due to the contractor under this agreement. Nothing herein contained shall be deemed to preclude or render inoperative the right of the purchaser as set forth in clause (P).

(T) The purchaser shall not be precluded or stopped by any return of certificate made or given by the engineer or assistants of the purchaser under any provisions of this agreement, from, at any time (either before or after the final completion and acceptance of the work and payment therefor, pursuant to any such return or certificate) showing the true and correct amount and character of the work done and materials furnished by the contractor, or any other person under this agreement, or from showing at any time that any such return or certificate is untrue and incorrect, or improperly made in any particular, or that the work and material, or any part thereof, does not in fact conform to the specifications; and the purchaser shall not be precluded and estopped, notwithstanding any such return or certificate and payment in accordance therewith, from demanding and recovering from the contractor the refunding to the full amount of the contract price, less 1 per cent. of the contract price for each and every week the time consumed by the purchaser up to the day upon which notice is served upon the contractor that the said automobile and accessories, or any part thereof, do not conform to the specifications, and it is the purpose of the purchaser to surrender, the said automobile and accessories upon receipt from the contractor of the contract price, less deductions as herein set forth.

(U) The contractor shall not pay, directly or indirectly, to any agent, representative or employee of the purchaser any commission, or other compensation, upon any account whatsoever bearing upon this contract, and the purchaser shall not be precluded or estopped from demanding and recovering a sum equal to any such payment upon discovery of the fact, or deducting the amount from the contract price before payment, if the information is obtained prior to the date of settlement.

(V) The contractor shall stand for loss or damage due to or caused by fire or other source sustained by the said automobile and accessories, or any part thereof, prior to the date of acceptance of the automobile and accessories by the purchaser.

(W) The said automobile and accessories when delivered shall be in good running order, fully adjusted in all its parts and ready for service forthwith, including a full supply of lubricating oil, liquid fuel, and needed supplies up to the limit of the storage capacity provided and specified.

(X) The contractor shall insure the said automobile and accessories against fire and accidental damage, and pay the premium thereon, and the said insurance policies shall be assigned to the purchaser forthwith upon delivery and acceptance of the said automobile and accessories. The said policies and each of them shall be taken out for one year, and each of them shall have at least nine-ninths to run upon the date of transfer from that date.

(Y) The initial run shall be made on such roads as the purchaser will select, and all damage sustained during the trial run by the automobile and accessories, or any part thereof, shall be borne by the contractor, provided the contractor or his representative is present, or if the contractor elects to allow the purchaser to proceed unattended.

(Z) The initial run shall be for a distance of fifty (50) miles out and back by any public highway the purchaser may select, and failure of the said automobile and accessories, or any part thereof, to properly perform shall constitute just and proper grounds for the rejection of the said automobile and accessories, or any part thereof, by the purchaser.

(AA) The clauses as follows are excluded from this contract. (.....), (.....), (.....), (.....), (.....), and the parties hereunto do agree hereby that the said clauses as herein set forth so excluded are not and shall not constitute a part of this contract.

Witnesses:

.....

.....Purchaser

..... (L.S.)

By.....Representative

.....

.....Contractor

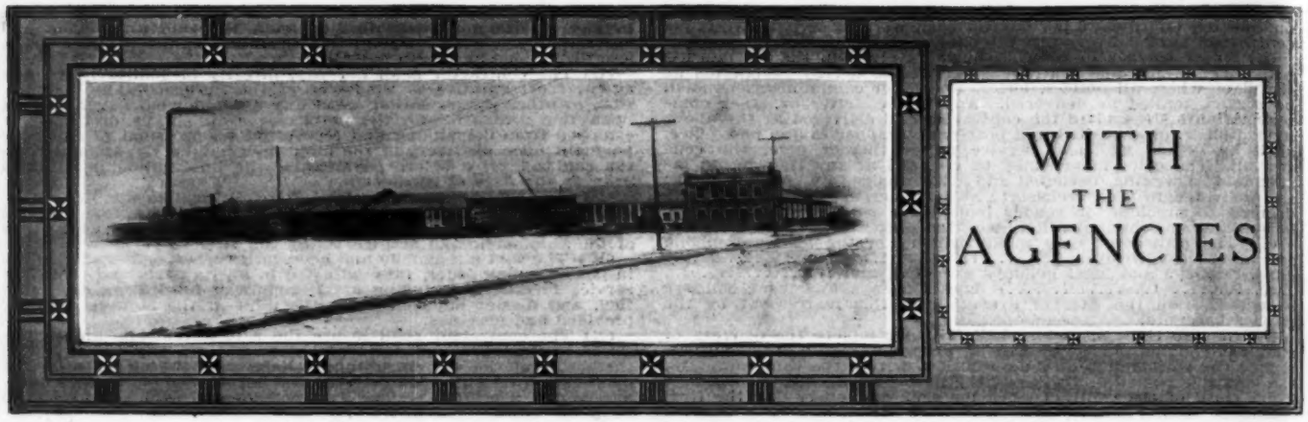
(L.S.)

By.....Representative

QUESTION, WHAT IS A CHASSIS?

FROM a discussion recently closed in *Motor Car Journal* (English) it appears that some uncertainty exists even in the trade as to the limits of a chassis, styled and purchased as such. A perusal of the interesting correspondence referred to shows that the issue really centers in the question as to whether tires are to be considered as an intrinsic part of a chassis in the absence of any special reference to, or scheduling of, them in makers' or importers' lists. Most persons seem agreed that steps, mudguards and other accessories appertaining to the body work are not to be expected with a standard quoted chassis. There is, of course, something to be said for the non-inclusion of a set of tires in a chassis purchase. Down to a year or so ago much more might have been urged against their inclusion because, while the consensus of trade practice was to include the tires, it was almost as often the experience that those furnished were unequal to the weight of the vehicle and speeds expected by the purchaser. Hence the practice grew of listing as an accessory stronger tires, or alternatively, by some equivalent means bringing it to the purchaser's notice that the standard equipment had a certain value, and a limitation that were for himself to determine should or should not be obviated at an added cost to himself. Present practice is more or less uniform in the matter of tire sizes for a given category of car. For this we have to thank the tire manufacturers, who indirectly have brought it about by the steps they took to prevent the unfair exploitation of their wares in the manner indicated. That the question of the inclusion or non-inclusion of tires as a standard part of present day chassis has now been raised is partly due to the effect of the tire companies' action, and largely to the stress of competition during the particularly bad and recent period. There is no doubt that precedent counts for much when disputes are referred to the courts, and there is equally no doubt that precedent as to the issue in question is on the side of including tires as a standard part of a chassis' equipment. The fact that, more recently, the practice has been opposed might, or might not, be regarded by the judges as having that sanction necessary to establish in the judicial mind evidence of trade custom; much in the same way that while hitherto and for the present a man's suit of clothes is taken to include the lining, trimmings and buttons, but a woman's costume is usually listed with the same items separately assessed, the sartorial trade might tacitly decide for a common rule in respect of the garments for both sexes. It takes time to establish a precedent having the sanction needed to invest it with a judicial worth, but it takes even longer to upset a precedent once accepted as a rule. Applying this dictum to the case of the tire, and having regard to the circumstances that brought about the recent departure, it may be doubted if a sufficient reason exists for debarring a purchaser from concluding—in the absence, of course, of a direct intimation properly promulgated to the contrary by the seller—that the purchase sum for a chassis is to be taken to include all appurtenances necessary to enable the machine—for such a chassis is until it is transformed into a carriage or other distinctive type of vehicle—to be adequately tested. A chassis without tires cannot be run, and as such lacks one of the essentials to the purpose and style of its construction regarded as a piece of mechanism, carrying an implied warranty of suitability for the purpose intended. No one would contemplate the purchase of a tire-less horsed vehicle, why then exempt a mechanically propelled one from the common rule and precedent?

While the same does not apply to the situation on this side of the Atlantic, all cars here being sold with tires, and with adequate sizes at that, nevertheless, it is of interest as showing the other man's viewpoint.



Great Western plant, where Great Western automobiles are made, depicting a Winter's scene and evidences of activity portrayed by a string of empty freight cars on the siding

Theodore Barnes, Jr., and David S. Hendrick have entered a partnership in Washington, D. C. They will handle the Pullman in that city and Virginia. Mr. Barnes was formerly connected with the Cook & Stoddard Company as a Franklin salesman. Mr. Hendrick was with the Warner Motor Company, agent for the Crawford.

The Pittsburg Automobile Company, Pittsburg, Pa., has removed from its former quarters in the Denny Building, at Seventh avenue and Grant boulevard, to Baum street. Leo Kauffman, dealer in auto oils and automobile supplies, has sublet its former establishment.

A. C. Harrington, for the past nine years with the Packard Motor Car Company, and late of the New York City branch, has left that company to take charge of the sales department of S. J. Wise & Company, New York distributors of the American Simplex.

The Kenny Motor Car Company opened its new building at 1474 Bedford avenue, Brooklyn, N. Y., on the evening of February 12, with an informal reception to the trade and others interested. A complete line of Rambler cars was on exhibition.

The Standard Motor Co. of Boston, Mass., recently incorporated, with headquarters in Boston, is agent in Massachusetts and Rhode Island for the Standard "6" and the Standard "4" types made by the St. Louis Car Co.

The Jonas Automobile Co., Davis Manufacturing Co., and Bartels-Maguire Oil Co., all well-known Milwaukee concerns, have been elected to membership in the Merchants' and Manufacturers' Association of Milwaukee.

Taylor Bros., of Milwaukee, Wis., representing the Hupmobile, have leased quarters at Wells and Sixteenth streets for garage and salesroom purposes. The firm has recently obtained sales rights for the Fiat in Wisconsin.

Henry Ford, president of the Ford Motor Company, who has stood for five years against the A. L. A. M.

L. B. Robinson now has charge of the Studebaker Auto Co. in Louisville, Ky. Mr. Robinson comes from Sioux City, Iowa. The new garage and salesroom is about ready for use.

Charles M. Green has been appointed distributing agent for the Monarch shock absorber. He has opened offices at 1036 Old South Building, Boston, Mass.

The Reliance Automobile Company, San Francisco, Cal., will shortly receive the Knox raceabout, with a 70-mile per hour speed guarantee.

Earlywine & Lewis will handle the Great Western "30" exclusively in Kosciusko County, Indiana, from headquarters at Mentone.

The Iron Range Automobile Co., of Virginia, Minn., is operating a garage and salesroom in that city. It handles the Ford car.

O. R. Hughes, of Marshfield, Wis., district agent for the E-M-F "30," has broken ground for his new garage on City Hall Square.

Taft & Henderson, of Whitewater, Wis., are handling the Ford in several counties of southern Wisconsin.

The Green Bay Motor Car Co., of Green Bay, Wis., has taken the agency for the Maxwell and Regal.

Ward & Dorr, of Whitewater, Wis., have been appointed district agents for the Brush runabout.

Great Western cars will be sold in Champaign County, Illinois, by Cruse Brothers, of Champaign.

The Lambert Automobile Co., agent for the Maxwell car, has taken on the National car.

Hans Sattler, of Sheboygan, Wis., is a new district agent for the Overland.

PERSONAL TRADE MENTION

J. R. Windsor, formerly with the E. R. Thomas Motor Co., Buffalo, N. Y., as special traveling representative in Iowa and the Middle West, has accepted the position of sales manager of the store opened at 1934 Broadway, New York, where A.-K. cars are handled. This company is the representative in the Eastern district for the Pierce-Racine cars, as well as having direct factory connections with the famous German house of Mercedes and the equally famous French makers, Lorraine-Dietrich. The company was formerly located at 3 West Forty-fourth street.

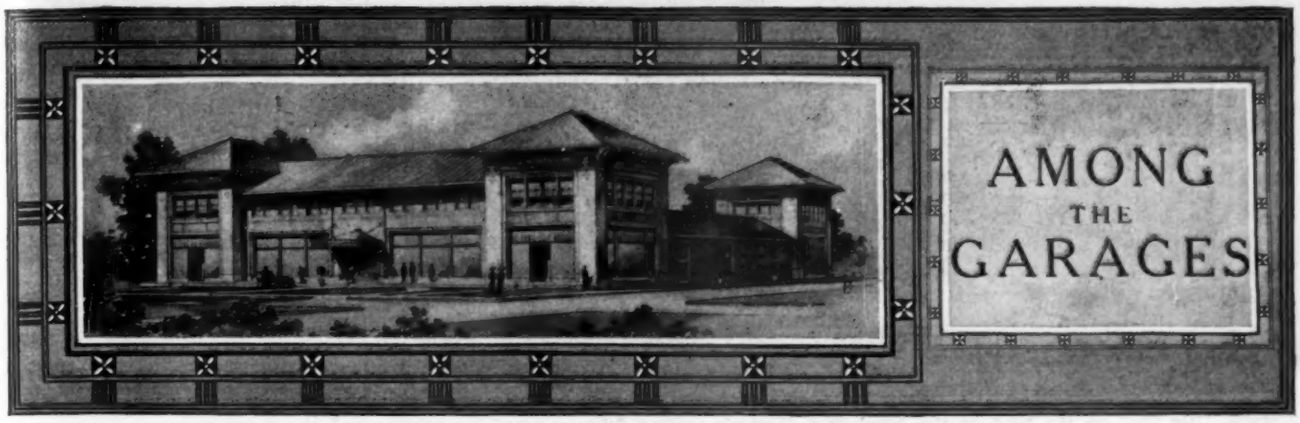
W. H. Wray, Jr., formerly with the Studebaker Co., of New York, has assumed charge of the motorcycle department of the Atlantic Motor Car Co., located at 225-227 West Fifty-seventh street. Mr. Wray is well known as the holder of many motorcycle records, among which may be mentioned the mile straightaway at Ormond Beach, Fla., against time, 44 2-5 sec. The Atlantic company handles, besides the New Era motorcycle, of which Mr. Wray will have charge, the Stoddard-Dayton and Courier automobiles.

J. V. Alden, of the Seamless Rubber Co., is making a tour of the country establishing branch houses. Mr. Alden has just completed this work in Boston, where a branch house was started at 685 Boylston street, under the supervision of A. W. Randall. Leaving there as soon as the business had gained a good start, Mr. Alden proceeded to New York to assist in starting the New York branch, which is mentioned elsewhere, and of which company he is vice-president.

F. A. Hall has been elected as vice-president and treasurer of the Cameron Engineering Company, Brooklyn, N. Y. For the past twelve years he has been manager of the chain block and hoist department of the Yale & Towne Mfg. Co. R. R. Hodgkins will succeed Mr. Hall.

E. H. Whitman, for the past ten years with the National Biscuit Co., has accepted the management of the New York branch of the Seamless Rubber Co., at 2002 Broadway.

Arthur M. Crumrine, formerly automobile editor of the Columbus, O., *News*, has been elected assistant secretary of the Columbus Automobile Club, succeeding Harry D. Sims.



New Baker Electric Garage at Cleveland, which is one of the most up-to-date structures of the kind, in which art, convenience, and economy of management are blended for a most complete whole

The opening of the Alvan T. Fuller Service Depot in Boston, at the junction of Commonwealth and Brighton avenues, marks an important epoch in the local trade, for it stands as a monument to the permanency of the industry and to the building up of the largest retail automobile business in the country. Fifteen years ago Mr. Fuller started in business as a bicycle dealer with a small store on Columbus avenue. He will observe his anniversary on Washington's birthday by inviting his customers to inspect the new service depot constructed at a cost of $300,000 solely for the care of Packard and Cadillac cars, for which he is the agent. It was made necessary by a business which this year will reach $3,000,000 in volume.

The service depot is of concrete and steel, absolutely fireproof, 70 by 341 feet in dimensions and with four stories and a basement. From top to bottom it is equipped with the most modern of machinery for automobile work and with the latest labor and time-saving devices. Every convenience for workmen and administrative force has been installed, the different floors and departments being connected by double stairways, a passenger and a large automobile elevator, electric dumb waiters, pneumatic tubes and telephone system. The administrative and sales department occupies the Commonwealth avenue end of the first two floors, the sales and show room being two stories high and the bookkeeping department being located on a mezzanine. There are private offices for the manager, the superintendent and the technical department.

On the basement level is the boiler room, a washing and storage room for cars belonging to the establishment, locker room for the workmen and lunch rooms. There is also the oil and kerosene room, from which lubricants and kerosene are pumped to all parts of the building. Gasoline is kept in a 1,000-gallon tank outside and pumped to all floors. On the street floor are two wide automobile entrances. This floor is used for minor repairs and adjustments and for the storage of repaired cars ready for delivery to their owners. On the second floor is a stock room carrying parts and accessories valued at $140,000, and a room for the storage of bodies, limousines in Summer and tourists in Winter. On the third floor is the department for the inspection of new cars and the attachment of accessories, the upholstery and top repair department and a large paint shop. The top floor is devoted exclusively to overhauling cars; it is possible for about fifty cars to be worked upon at the same time. On this floor are the forge shop, machine shop, tool room and cleaning room. Every floor has its oil and gasoline room, and there is a special room for recharging batteries and repairing magnetos.

Mr. Fuller will retain his quarters in the Motor Mart in Park Square for sales purposes and the large second-story apartment formerly used as a shop is being transformed into a salesroom for second-hand cars, the salesrooms on the street level being used exclusively for the exhibition and sale of new Packards and Cadillacs.

The Columbus, O., agency of the Oldsmobile and Oakland, which has been financed by H. E. and E. B. Armbruster, has been purchased by G. W. Miller and W. L. Offenbacher. The agency will remain at the same location, 61 East Spring street. The concern expects to sell a large number of cars during 1910.

The Harper Auto Inn & Sales Company, of Wauseon, O., capital stock $20,000, has been incorporated by R. F. Harper and W. J. Harper, two well-known repair men in Fulton County. The new concern will have the agencies for the Buick, E-M-F, and Hupmobile. Plans have been prepared for the erection of a garage 60 by 200 feet, two stories high and fireproof.

The American Machine Co., of Eau Claire, Wis., organized several weeks ago by J. C. Tanberg, a well-known automobile dealer, to manufacture a new type of spark plug of pipestone, chemically treated, has started work on an order for 500,000 plugs from a big motor supply house in Chicago. (Ed.—Can't ascertain name.) The order was obtained by Mr. Tanberg. This and other large contracts have made the present quarters on North Dewey and Wisconsin streets entirely inadequate and until larger shops can be leased other Eau Claire manufacturers will assist in the production.

The Chicago Motor Car Co. announces that it has completed its facilities at the new establishment which has been under preparation for some time, the location of which is Michigan avenue and Twenty-fourth street. The new establishment is so commodious in its appointments that the usual highly efficient Packard service will be the regular thing.

The Wilke Auto & Machine Co., of Sheboygan, Wis., has moved into its new quarters, at Center avenue and North Eighth street. The new garage is 60 by 38 feet in dimensions, with concrete floors, steam heating system and a complete station for recharging electrics. The shop will remain in the Deland building, where it is now located.

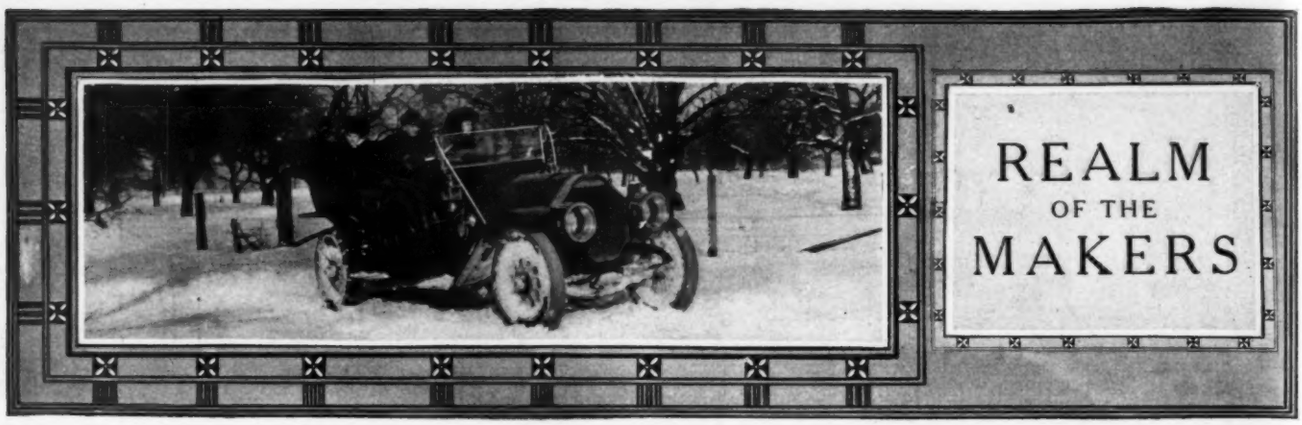
G. H. Luch & Co., of Keene Valley, N. Y., is building a garage which will be positively fireproof and 32 by 70 feet. It is proposed to make this garage one of the best in this section of New York. The tool equipment is to include every possible facility for efficient garage work.

Under the new selling arrangement recently adopted by the manufacturers, Fulton, Conway & Company have taken the Louisville and Kentucky agency for the E-M-F car. The concern has established headquarters at 819 West Main street.

Axel Peterson, of Escanaba, Mich., has purchased the Lacomb building, at 303 Ludington street, and will convert it into a garage. Mr. Peterson has had quarters in the Knights of Columbus building, at Ludington and Wolcott streets, Escanaba, for some years.

Trachte & Grahlman, of Johnson Creek, Wis., implement dealers, have decided to remodel their new building and devote a large part to a garage. They are considering several well-known lines, appealing to small towns and country districts soon to be announced.

James Couzens, general manager of the Ford Motor Company, who supports the Ford policy



Thomas "Big Six" on the road as the jewel in a Winter's setting fully equipped for touring and the instrument for enjoyment to the owner of the wintry weather

It has been definitely settled upon that the Racine Manufacturing Co., of Racine, Wis., which suffered the loss of its plant by fire on December 12, will rebuild in Racine. The first move is the filing of an amendment to the articles of incorporation increasing the capital stock to $400,000 from $50,000. Racine and Milwaukee capital has been interested in the new issue. Contracts have been awarded for the first new building, to be completed in May. L. E. J. Gittings, formerly associated with the J. I. Case Threshing Machine Co., of Racine, becomes treasurer of the company. F. F. Blandin remains as president, and George Jaegers as secretary and general manager. The company is now in temporary quarters, employing 600 of the original force of 1,200 men, and more than 4,000 bodies are now being finished. The company will confine its efforts to the manufacture of automobile bodies, the piano stool end having been taken over by Solomon Grollman, who has incorporated the Racine Stool Manufacturing Co. Every style and type of body will be produced.

The Superior Motor Vehicle Company, which is now located at 150 Michigan street, Buffalo, N. Y., was recently incorporated to manufacture motor trucks and commercial vehicles. The company will build a more extensive plant than was at first intended, and has purchased additional land for that purpose at Elmwood avenue and the New York Central Belt Line. This location is just opposite the plant of the Pierce-Arrow Motor Car Company. Two buildings will be erected, both two stories high; one of them will be 70 by 400 feet and the other 70 by 500 feet. The plant will also include an engine and boiler house. J. Willard Lansing is president of the new company.

The Falls Machine Co., of Sheboygan, Wis., has increased its capital stock from $15,000 to $150,000 for the purpose of engaging in the manufacture of gasoline engines for automobiles on an extensive scale. The greater part of the production has been contracted for by the Warren Motor Car Co., of Detroit. Angelo R. Clark has assumed a large interest in the company and at the reorganization meeting was elected secretary. Gustav Huette was elected president, the other officers being: vice-president, Albert Leicht; treasurer, Walter Koehn. Additions and improvements necessary for the increased production are about to be made.

Business men of Janesville, Wis., have started to raise the stock subscription fund required by the Monitor Motor Car Co., of Chicago, as a condition of removal to Janesville. A block of $50,000 of stock will be distributed in Janesville by a committee consisting of M. O. Mouat, Sanford Soverhill and Frederick Beilhart. Options have been taken on the Green & Sons warehouses as a factory for the manufacture of commercial vehicles in anticipation of success in producing the necessary bonus. A committee visited Chicago last week and was favorably impressed with the Monitor concern.

The first automobile to be produced by the Racine-Sattley Co., of Racine, Wis., well known carriage builders, is being exhibited at the National show in Chicago this week. It had been decided to exhibit only automobile bodies, a recent product of the company, because it was not believed possible for the entire car to be completed. The Holbrook-Armstrong Co., of Racine, delivered the first engine under its contract with the Sattley concern in time for the show.

George Stephenson, of the Stephenson Motor Car Co., Milwaukee, and F. A. Groves, of Chicago, made a trying run from Chicago to Milwaukee, ninety miles, last week. Mr. Stephenson drove a Speedwell and Mr. Groves a Staver. At times the roads seemed impassable and the cars were hidden from sight by drifts. The run was made to test the Staver, which acquitted itself admirably.

Barney Oldfield, in the Cleveland, O., *Press*, recently paid a very high compliment to Mrs. K. R. Otis, Cleveland, noted woman driver. He states that Mrs. Otis beat his record between Cleveland and Buffalo in a Stearns roadster. It is said that during the trip she made the drive from Cleveland to Toledo in three hours and five minutes.

The Mitchell-Lewis Motor Co., of Racine, Wis., has started work on the Special Model S, six-cylinder, cross-country car, to be used by William T. Lewis, chairman of its executive board, in his tour of Europe and Asia with Mrs. Lewis. It will be ready May 1 and will be shipped to the Continent in advance.

The Buick Company recently shipped 40 carloads of automobiles from its Flint factory to Dallas, Texas. This shipment, said to be a record-breaker, went South as a solid train, with a tonnage of 450,200 pounds. One hundred and twenty-seven machines made up the consignment.

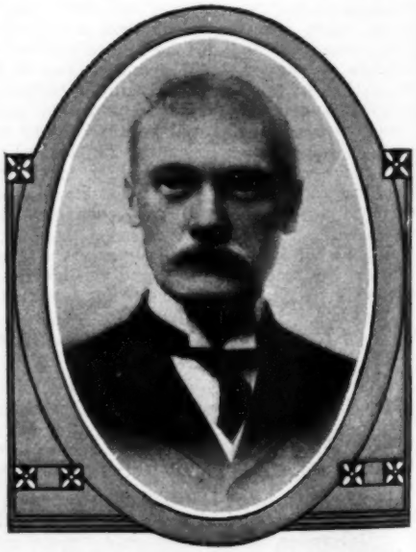
The Standard Automobile Company, Kansas City, Mo., is expanding. It has recently taken over a part of the factory at Wabash, Ind., and, in addition, operates two other factories in St. Louis. It is said that all of these plants are now being worked in full capacity.

The Seagrave Manufacturing Co., of Columbus, O., has completed a modern two-story fireproof addition to its plant, which will increase the floor space more than 16,000 square feet. The addition will be used to build the motors of the motor-propelled fire apparatus.

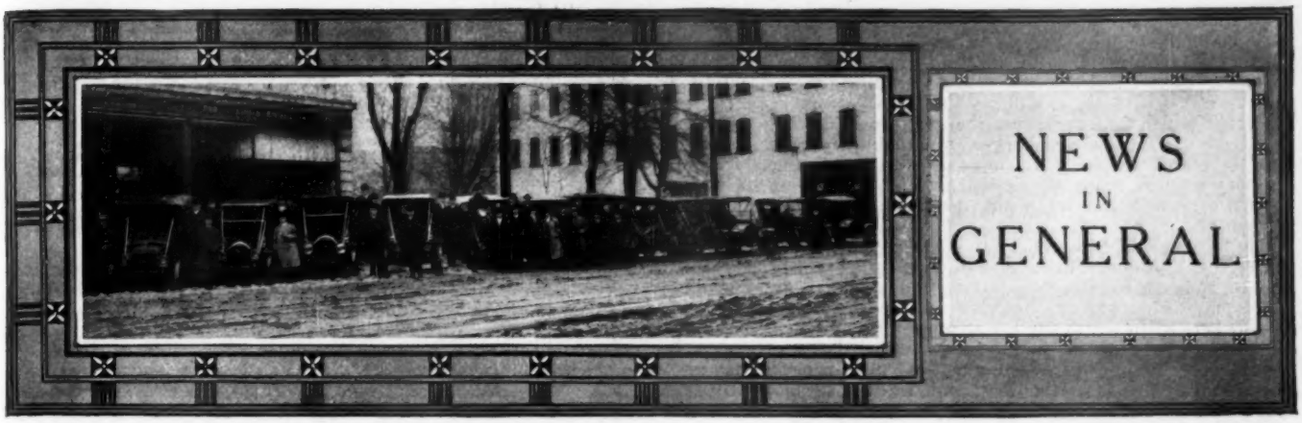
The firm known as the W. N. Best American Calorific Company has retired from business, and Mr. Best now personally manufactures and sells the oil and tar furnaces, of which he is the inventor, at his office at 11 Broadway, New York City.

The Decatur Motor Car Company, of Decatur, Ill., formerly the Coppock Motor Car Company, will turn out a line of runabouts in the near future. It is stated that H. W. Meyer will be the manager of the concern.

The Standard Brass & Iron Works, 1820 St. Paul avenue, Milwaukee, Wis., has started the manufacture of a line of tire irons in addition to the extensive repair shop business.



Col. Charles Clifton, president of the Pierce-Arrow Motor Company, and of the A. L. A. M.

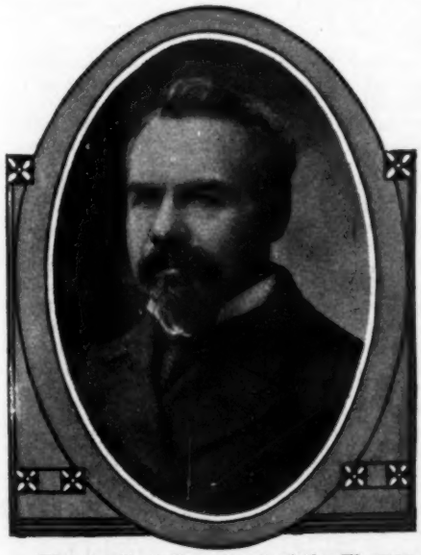


A battery of Cartercars which were placed at the disposal of the "press" when the intelligence department gathered from Detroit and Cleveland honored Buffalo by its presence

Arrangements for the second annual motor show under management of the Milwaukee Automobile Club, in the new $500,000 Auditorium, February 22 to 27, inclusive, are progressing nicely, and General Manager Clarke S. Drake, president of the club, believes that Eastern and Western manufacturers will be pleasantly surprised at the magnitude of the exposition. This year the club will make the show an elaborate social function, and Milwaukee society leaders are taking a deep interest. The Governor and State officials have promised to be present on the opening night, "Society Night," on Washington's Birthday, and will arrive in time for the private view at 2 o'clock in the afternoon. The club will tender a banquet to visiting manufacturing interests, the press, State and municipal officials in the afternoon. This week President Drake and about one hundred members of the club are visiting the Chicago show to get ideas and to solicit further displays.

Senator Timothy Burke, of Green Bay, Wis., member of the special joint legislative committee on good roads, which recently made its report to the Governor, has issued the following announcement, which is welcomed by owners in northeastern Wisconsin:

"While we are waiting for the enactment of our State-aid highway law, let us not forget that we are in a position to mprove the highways of the State, particularly those on heavy clay soils, very materially. I refer to the use of the 'split log drag' used so successfully in this and other States. Chapter 101 of the Laws of 1909 provides that a town board is authorized to have its earth roads smoothed over by the use of such drag, at a cost of not more than 75 cents per mile, a preference to such work to be given to the adjoining landowner or tenant. By the use of the drag the worst kind of clay road can be put in excellent condition at a cost not to exceed $10 per mile. Thereafter the maintenance is a small matter. A split log drag can be constructed by any one at a cost of about $6 or $8."



Thomas B. Jeffery, head of the Thomas B. Jeffery Company, whose fighting ability has rendered him immune

The Wisconsin Secretary of State says there is much confusion relative to the Wisconsin registration law, not a few owners believing it, like the Michigan law, requires annual license fees. The Wisconsin law provides that all who registered prior to June 19, 1909, when it went into effect, must pay an additional fee of $1, and owners registering thereafter must pay $2. About three-fourths of the owners who registered prior to June 19 have paid the additional fee, although the time limit has long since expired. The secretary is giving them plenty of time.

Representatives of the Standard Oil Co. have been visiting several cities of Wisconsin during the last few weeks to interest the common councils in the plan of using crude petroleum for street sprinkling. Figures based on tests in Milwaukee are being used to good advantage, although it is doubtful if the plan will be practicable in cities without asphalt, brick and cement pavement. Milwaukee has contracted for 500,000 gallons of oil for next year's extensive street sprinkling scheme. The city of Oconomowoc, one of the best known summer resorts in the West, has practically decided to follow the plan.

Alfred Johnson, of Menominee, Wis., conducting a large machine and motor car repair shop, has invented a motor sled that has been successful under strenuous tests in deep snows of Northern Wisconsin. The sled is propelled by a pronged driving wheel, under power of a 2 1-2-horsepower engine. It travels from 12 to 25 miles an hour, depending upon condition of the surface.

The Point Spark Plug Co. has just filed papers of incorporation with the Secretary of State at Pierre, S. D. They incorporate for $15,000. The officers are Fred W. Smith, president; Arthur E. Sweet, vice-president, and Guy H. McClain, treasurer. Their new factory is completed and their machinery all installed.

The Milwaukee Common Council, which spent $25,000 for municipal motor cars during 1909, may purchase a motor ambulance for the Johnston Emergency Hospital, if Alderman Joseph P. Carney's resolution is passed. The city now owns a motor police patrol and eight other cars.

At the National Exhibit of Motor Boats, which will open in New York February 19 to February 26, inclusive, there will in all probability be more exhibitors than ever before. It is said that space has been provided for 150 exhibits, and that more applications have been received than can possibly be accommodated.

The Columbia, S. C., automobilists will shortly have an endurance run to Pinehurst. Information indicates that great interest is being taken in this event. Among others, E. W. Robertson, Frank R. Gibbes, G. M. Berry, E. A. Jenkins, W. L. Blanchard, F. S. Terry and Dr. Whaley have promised to enter cars.

In the construction of the new board automobile track at Los Angeles, Southern California, three million feet of Oregon pine planks and beams are used; to hold these together not less than 200,000 pounds of nails and spikes and a few tons of bolts will also be necessary.

The Ohio State Automobile Department has made a ruling which requires all applications for 1910 registration to contain the manufacturer's serial number. This ruling is made for the better protection of automobile owners in case the car is stolen.

The Campbell Automobile Company has moved its home office from Ft. Dodge, Ia., to Des Moines. An amendment to the articles of incorporation, covering this change, has been filed and the move will be complete in time for the Spring rush.

The Tower Grove Motor Car Company, of St. Louis, Mo., has been incorporated, with a capital stock of $5,600, and is to manufacture and deal in automobiles. Incorporators: Thomas W. and H. B. Wiley and F. L. Schleicher.

The Wisconsin Auto Top Company, of Racine, Wis., has started operations in its new plant at Racine Junction. The concern was organized several weeks ago to succeed McAvoy Bros.

The Strawffer-Atterburn Motorcar Company, Louisville, Ky., has been incorporated with a capital stock of $4,000.

PROMINENT ACCESSORIES

Mention of several different parts and accessories is made in these columns which are likely to fill the wants of automobilists, whether recognized or only in the shape of impressions lying dormant. It is often the case that on reading the description of some novel accessory, it will be found to just fit an idea long neglected under the impression that there was nothing to be had to satisfy it. As some makers of automobiles persist in putting nuts in places where it is impossible to reach them with an ordinary wrench, many people will find of great service a special wrench set which can reach into the most remote corners of the mechanism.

The "Stickit" wrench set, a "Bay State" product sold by G. A. Cutter, of Taunton, Mass., is alliteratively described as "seven strong stamped steel sockets strung on a square steel shank." The square steel bar or shank forms the backbone of the set. The sockets when not in use are strung on it; any one desired for use can be placed on the end, where it is held by a spring catch. A ratchet wrench is provided, the hole in which fits the steel shank, and by means of this the shank and the socket on the end are turned. The other end of the wrench will fit the sockets separately without the bar as an intermediary. The upper end of the bar has a knob which may be held in one hand to steady it while the other hand works the wrench.

In application the sets may be used in more ways than might be supposed. The wrench alone fits four sizes of nuts and the sockets will take eleven sizes of nuts and cap screws. The wrench is fastened to the shank full of sockets when not in use by a strong leather strap and shield. This, together with the use of a leather washer on the shank, entirely prevents rattling. The complete set takes up no more room than a large screwdriver, and can be rolled up with the other tools.

The Baldwin Chain & Manufacturing Company, of Worcester, Mass., is now offering to the trade a new and improved steering gear, known as the "Brown." This is a considerable departure from customary types of steering gears, the principal idea in its design having been the correction of the tendency to develop back-lash. In the usual construction the thrusts are taken on the teeth of a worm and sector, or of a pinion and gear, or by other means in which only a line contact is available. In the Brown gear these line contacts are replaced by contact between surfaces, and the surfaces are so broad that the wear on them is practically negligible.

The gear has a bevel pinion mounted on the lower end of the steering column, meshing with a gear; so far the arrangement is conventional. The novelty lies in the method of taking the road shocks off of this gear. To this end the gear is eccentrically mounted on a crank; the crankshaft, which also is eccentric to the gear, carries the swinging arm which connects with the front wheels. The crank referred to has, instead of a pin, a square, or, rather, rectangular lug projecting from its cheek. This projection fits between two segments which with it form a complete circle, and the whole nests in a circular depression in the flange of the gear.

For the gear to move the crankshaft, or for the crankshaft to move the gear, it is plain that as the centers of the two do not coincide, there must be a sliding movement somewhere in the connection; this takes place between the lug on the crank cheek and the segments between which it rests. The leverage, however, is in favor of the gear, as against the crank; thus it will be harder for the front wheels to turn the steering wheel through the crank acting against the gear, than for the steering wheel to turn the front wheels, through the gear acting against the crank. The degree of resistance is regulated by the relative position of the centers.

D. M. Parry, president of the Parry Automobile Company, who is a big fish among the new independents

The parts subjected to the severe shocks coming from the road wheels are only the crank projection, the segments between which it rests, and the walls of the circular depression in the gear flange; all have very wide surfaces constantly in contact. The wear, distributed over such a wide area, becomes negligible at any one point, and, furthermore, the severity of the shocks is taken off the more delicate gear teeth. Thus the appearance of backlash is put off indefinitely.

In addition to its line of automobile tires the Diamond Rubber Company, of Akron, Ohio, has now a complete line of ignition wire and cable. Anyone who has ever had anything to do with automobiles knows how much trouble poor cable can give, and the worst of it is that such trouble is usually hard to find and assign to a definite source. The Diamond 3-8-inch secondary cable has been used successfully for several years by a number of prominent manufacturers with good satisfaction. It has the regular strand of 37 wires of 30 B. & S. gauge, insulated with a high-grade rubber compound and covered with a black glazed braid. The Diamond company bases its claims on its thorough knowledge of rubber chemistry and the ways of applying it.

Among the patents recently granted to manufacturers of automobile accessories is one to the Graves & Congdon Company, of Amesbury, Mass., on its "Luxury" auxiliary seats. The claims allowed are sufficient to cover all of the best points of the seat. Two of the features are the dovetail socket which supports the seat and the feature of construction which makes it easy to swing the seats around while in use. These seats fold back into an extremely small space, the skeleton back models having a thickness of but a few inches when folded. Thus they are desirable for use in cars where space is limited, although it may be necessary to carry extra passengers occasionally. When the seats are taken down they leave no protruding brackets or supports. They are held in the car by means of a dovetail socket and bracket; when the seat is taken down the socket remains, but is practically invisible. Once this socket is in position on the car no tools are required either in the setting up or the taking down of the seats.

"Luxury" seats are made in three different models, one with full padded back and the other two with skeleton backs. All are made in any color leather to match samples, and are stuffed with the best grade of curled hair. The full back model is deep and luxurious; the skeleton back models, although not taking up so much room, have well padded back rests and are very comfortable. The framework is of steel, forgings being used wherever desirable. Each seat may be swung through half a circle.

Despite the recent general improvement in electrical construction, the ignition apparatus of the car is as a rule by no means as immune to injury by water as might be expected. A few magneto makers have seen fit to enclose the mechanism of their product in such a manner as to make it water and dust-proof; there are, however, a considerable number of magnetos in service, most of them, let us hope, of early models, which are put out of business by a good drenching, such as may be experienced in fording a creek, or even by running on a rainy day. For such magnetos one of the best remedies known is the Mesinger magneto cover, made by the H. & F. Mesinger Mfg. Co., 1801 First avenue, New York City.

This is a well-put-together leather casing that fits accurately over the standard sizes of magnetos in such a manner as to form a waterproof protection; in fact, the fitting of the cover is such as to make it almost dust and dirt-proof. The article is made to order, and special sizes of magnetos can be fitted if dimensions are furnished.

Among the windshields which are gaining favor is the "Model," which is the product of the Model Iron & Wire Works, Milwaukee, Wis. This is one of the "universal" persuasion, and has the lower half set back at a permanent angle, especially suitable for runabouts on which there is considerable footroom between the dash and the seat. It has been found that on cars of this type, which are deservedly popular, a shield which stands straight up on the dash affords little or no protection to the occupants of the front seat. On the contrary, the wind currents rush around the shield and often those from the two sides meet directly on the occupants instead of behind them, as they would were the seats set closer. As it is not likely that anyone who has ridden in a car with plenty of legroom would care to go back to the old style cramped position, the problem seemed to be up to the windshield makers, and they evolved the inclined shield.

The "Model" shield has a rather neat locking device, consisting in brief of a crescent or circular sector rigidly attached to the lower half frame, with its center on the hinge line, and a lever on the upper half swinging over the sector and clamped to it in the desired position by a setscrew.

PATENTS AND PROCESSES

The patent law of Denmark is brief and to the point. It provides, among other things, that a patent can be obtained only by the inventor or his assignee. In the case of more than one application the preference is given to the first applicant. Every applicant for a patent not a resident of Denmark must appoint a resident representative. Inventions capable of being utilized in industry or capable of industrial exploitation are considered patentable inventions. Like many other European countries, the law of Denmark provides for three kinds of patents. The first is for patents of invention, the duration of which is 15 years, dating from the date of issue. The second classification is for "dependent patents," for improvements made on inventions patented by a person other than the applicant. The duration of this class of patents is also 15 years. "Patents of addition" comprise the third class, and they expire with the principal patent.

The filing tax is $5.36, while the fee for issuing a patent is $2.68. The annual taxes are as follows: The first three years, $6.70 each; the following 3, $13.40 each; the following 3, $26.80 each; the following 3, $53.60 each; the last 3 years $80.40 each. Applications for a patent must be addressed to the patent commission, at Copenhagen, and must be in duplicate. Together with the application must be filed a description of the invention, which must also be in duplicate. When it is necessary for understanding the description, a drawing, in duplicate, is required, and, according to circumstances, a model, sample, etc. When the applicant is not a resident of Denmark, he must file, in addition to the above papers, a statement showing the appointment of a general representative residing in Denmark, which must be accompanied by the acceptance of the representative. The application, on stamped paper, must indicate the name, profession, and the residence of the applicant, as well as the title of the invention. It must indicate the name of the inventor, and, if it is filed by another, contain proof of the assignment. The description must be sufficiently complete to permit the invention to be carried out. It must indicate exactly what constitutes the claims of the invention. The application and description must be on paper of official size.

One of the copies of the drawings must be on white cardboard of 33 centimeters in height by 21, 42, or 63 in width. All the figures and writings of the drawing must be executed in India ink, in very black and clear lines, without colors, within a line traced at 2 centimeters from the edge, a clear space of 3 centimeters being left at the top. The signature must be placed in the lower right-hand corner. The second copy must be a tracing on muslin. All documents must be in Danish.

The grant is as follows: Preliminary examination as to formalities prescribed and as to the patentability of the invention; publication of the application will call for opposition. The time allowed for opposition is 8 weeks. In case of rejection the applicant may appeal to the patent commission itself, afterward to a special commission to be appointed by the Minister of the Interior. Patented inventions must be worked in Denmark within 3 years from the date of the patent and must not be discontinued for more than 1 year.

The patent law of Switzerland provides that a patent is valid only when granted to the inventor or to his assignee. Persons not living in Switzerland must appoint a representative in that country.

Patentable inventions are new inventions which may be applied in the arts and are capable of being represented by models. Inventions are not considered new which at the time of application for a patent are sufficiently well known in Switzerland to enable a person skilled in the art to execute them. Inventions excluded from protection are those which cannot be represented by models. Methods or processes cannot be patented under the Swiss law.

All applications for patents must be addressed to the federal bureau of intellectual property, at Berne. There must be joined to each application a description of the invention, the drawings necessary for the understanding of the description; the proof that a model of the object invented exists or that the invention itself exists; the sum of $7.72, representing the fee for filing and the first annuity; a power of attorney if the application is filed by a representative of the inventor; a declaration having the signature of the inventor, certified to by a competent authority or by a notary, establishing the right of the holders of the interest, if the patent is not applied for in the name of the inventor; a memorandum of the documents and articles filed.

The application must be written upon a form furnished by the Swiss administration. The description of the invention and the drawings must be filed in duplicate. The application and the documents which are joined thereto must be written in one of the three languages, French, German or Italian. All parts of the application must be in the same language. The title under which the application is presented must designate in a precise manner the subject of the invention.

The applicant for a patent who desires to enjoy the benefit of a time allowance of priority established by international treaty may file the documents which establish the rights which inure to him from an anterior filing. He may also confine himself to mentioning upon the application form the facts serving as the basis for these rights. The description of the invention must make known clearly its import and be so written that one skilled in the art may therefrom carry out the invention. It must terminate with a résumé of the features of the invention which are of special importance. By this is meant the claims of the invention.

The drawings, in duplicate, one copy on bristol board and the other on tracing cloth, must be executed under the following form: Thirty-three centimeters high by 21 wide, 33 centimeters high by 42 wide, or 33 centimeters high by 63 wide. As far as possible the small or medium form should be used. Each sheet of the drawing must be surrounded with a single line drawn 2 centimeters from the edge. It must have at the left, at the top, the name of the applicant and the date of the application, at the right, at the top, the number of sheets filed and the number of each sheet, and at the right, at the bottom, the signature of the person filing the documents of the application. One of the duplicates, intended for photographic reproduction, must be executed upon strong, smooth, and white drawing paper. It must be neither colored nor painted with a wash. The lines must be in good black ink. The hatchings must be separated. The second duplicate must be a reproduction of the first upon tracing cloth and it may be colored. The drawings must not be folded or rolled. They must be sent perfectly flat and not creased. Close attention should be paid to these details, as the law is very strict about compliance with the rules laid down.

There are two classes of patents in Switzerland. The first is known as patents of invention, the duration of which is 15 years, starting from the date of the application. The second class embraces patents of addition, which have the same duration as the principal patent to which they refer. A complete patent of invention is granted only upon proof of the existence of the model. In default of this proof a provisional patent is granted, which can be changed into a complete patent within a limit of 3 years, to date from the day of the application, by furnishing proof of the point in question.

The filing fee is $3.86; the first annuity, $3.86; second annuity, $5.79, etc., increasing $1.93 each year. Patents of addition are subject only to the payment of the fee for filing.

Regarding models: The proof of the existence of the model is shown—models of which are forwarded, the filing being obligatory. These consist of inventions which are essentially composed of substances difficult of identification, inventions which are characterized by properties which ordinary means of investigation do not admit of establishing. Or there may be a permanent deposit of photographs representing the invention in a precise and complete manner or a temporary deposit of models or satisfactory photographs, not to be permanently filed but only for the purpose of comparison. The fee for comparison in the federal bureau is $1.93.

Patents are granted upon proof that the documents and fees prescribed have been filed in the manner indicated by law. In case of the refusal of a patent the interested party may have recourse to the Federal Department of Justice and police within four weeks. Further than this the applicant has no recourse.

Carl G. Fisher, president of the Indianapolis Speedway, on which automobiles are tried out

Some Gooa Reasons for Double Ignition

By W. A. Stiles

COINCIDENT with the development of the modern automobile there has appeared each year a demand for increased reliability and greater efficiency. Slipshod parts, needing constant attention and replacement, no longer meet the requirements for a high-priced, first-class car, or, for that matter, for the cheaper cars of to-day. Among the things which have received a tremendous impetus from this demand in the past few years is the manufacture of the ignition apparatus which is used in this kind of work.

It was not so very long ago that the vibrator coil was in great demand and in almost universal use. Then came the magneto, which developed possibilities not obtainable with the older system, and with the great advantage of producing its own current, thus eliminating the necessity for carrying dry or storage batteries. The high-tension magneto is to-day the result of this development, and is, without question, one of the most satisfactory means of ignition which we have to-day, as its widespread use indicates.

There is, however, the inevitable "fly in the ointment" which is generally found in things humanly constructed, and which, in this case, makes the magneto far from ideal for most cars as a sole means of ignition. This is the fact that the spark generated by the magneto at low speeds is, as often as not, very unsatisfactory for running on high gear in crowded streets, and it also makes cranking rather hard, spinning the engine being the only method in most cases to get a satisfactory spark.

There are, of course, some manufacturers who use a single set, either a magneto or a single spark system in most cases, and, provided the system be a good one and well made, it will give excellent satisfaction without the aid of any other second system. It cannot be said, however, that this represents popular high-grade practice of to-day, even though three or four first-class manufacturers may be using it, since the tendency is decidedly toward the use of the two systems.

Several Dual Ignition Systems in Use

Considering, then, the question of dual ignition, or double ignition, we find that there are different means for securing the same result. There is the one method consisting of a high-tension magneto and a battery set for starting, the latter system distributing the high-tension current through the magneto distributor and using but one set of secondary wires and plugs.

This necessarily tends toward an extremely simple set of wiring and one which takes up very little room, the circuit of which is easily traced out by a novice. The battery part of one of these systems generally works with two to five ordinary dry cells in series, although it is possible to get a fairly good starting spark on even one cell if the primary winding be of low resistance and wound especially to admit the passage of the current under this low voltage.

For this purpose mentioned above, a button or spring switch is usually placed on the dash, by pressing which the current from the battery is sent through the primary winding in the coil. Removing the pressure ruptures the current and, of course, induces an extremely high-tension current in the secondary winding, which is carried to the right cylinder by the distributor.

This starts the engine, when the magneto immediately begins to generate its own current, and the battery may then be shut off. Owing to the short space of time per day in which the battery is in use, its life is greatly lengthened, and even though the starting spark fails to work, owing to poor mixture or other defects, the battery spark is still extremely useful in cranking the car, as it saves the annoyance, as stated before, of spinning the engine to generate magneto current.

In many cases a storage battery is substituted for the dry cell (as the latter is apt to deteriorate whether used or not), and, having so little service put upon it, the former should last for an indefinite time. It will be seen, therefore, that this system is in reality one and one-half systems; that is, while there are two sources of current, there is but one transformer and distributor.

Two Separate Systems Better Known

The other kind of system is, probably, more well known than the one which has just been described, and consists of two separate and distinct ignition outfits. A system of this sort is supplied to-day on practically every high-grade car in the country, and almost invariably consists of a high-tension magneto on one side, and a vibrator coil, unit distributor coil with one vibrator, or a single spark system for the other set.

Some of the most prominent manufacturers give a vibrator coil set with a storage battery, evidently preferring a separate coil for each cylinder, in spite of the greatly increased complication. There is no question, however, that the single unit coil presents many advantages over the multiple coil, and this in every way is efficient. The only point in favor of the former is that by the use of four coils it is unnecessary to have a distributor, but modern design on distributors is so good in the majority of cases that they have become even more reliable than a commutator, owing to the very slight wear which they have in operation, there being no rolling or moving contacts.

It has been objected that a coil is simetimes overtaxed in building up and breaking down the magnetism of the core at high engine speeds while doing duty for all cylinders; but while this may be true for a poorly designed coil, a good one generously proportioned will not limit the engine speed as much as the vibrator or even contact maker will.

As against these slight objections, the decreased bulk, improved appearance of the dash, smaller cost and simplicity would seem to indicate that the more conservative manufacturers will sooner or later fall into line and adopt the latter system as a part of their standard equipment in double ignition.

More Advantages in Two Sets of Apparatus

Considering the respective advantages of these different systems further, it would seem that the equipment embodying two distinct systems would present more desirable features than the single distributor and plug system. In the first place, with the former, it has two contact making and breaking devices, which are absolutely separate and are driven by separate shafts. With the latter system there is but one contact maker, and should it give out both batteries and magneto are useless.

The same thing would happen should the timing gears on the half-time shaft give out; although this is not a very frequent occurrence, nor is it likely to happen. The above objection applies to the distributor as well, which may become short-circuited by water, mud or oil. Now, one of the useful things about a double ignition system is the fact that should the spark plugs foul on one or a part of the mechanism give out the engine may be shifted to the other set.

Excellent Features in Every System

We find, then, as with many other things, that each system has certain excellent features and certain limitations, and in this case the following points will influence the buyer. The single coil-distributor set is simpler, has less wiring, and is less expensive. The other method of equipment, which provides two of all the necessary working parts of two systems, undoubtedly offers greater protection against ignition troubles. The question which must be settled is that of expense vs. returns. Without doubt, the ultimate goal is that of a single system which needs no backbone to give reliable results, and this is the sort of apparatus which we will probably see in a short time on all cars, high or low priced.